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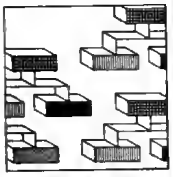

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NEWSPAPER

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Apple declared a truce with cofounder Steve Jobs. **Page 122.**

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Maintenance backlogs at some Fortune 500 companies drag out to as long as 23 months. **Page 31.**

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A call was issued last week for a user boycott of equipment manufacturers that do not sell parts to service firms. **Page 14.**

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Ashton-Tate folded Multimate's site licensing option while other vendors reconsider their own licensing policies. **Page 2.**

■

Hewlett-Packard's first reduced instruction set computing-based system from its touted Spectrum program will be unveiled at its Feb. 25 annual shareholders' meeting, the company reportedly told market analysts recently. However, the 4 million instructions per second machine may not be delivered until the fourth quarter of this year — a major setback. The system is said to feature HP 3000 emulation mode and native RISC mode.

■

A low-end data base product, codenamed Black Gold, is one of four new products planned for introduction by Ashton-Tate by the second quarter of this year, sources close to the company said.

■

Prime Computer is discussing a business relationship with Apple, but "nothing is imminent," according to Prime spokesman Joseph Gavaghan. Prime has developed software with which the Macintosh can be linked to a Prime mini as a terminal, he said. Apple wants Prime to be a value-added reseller of the Macintosh, but Prime wants Apple to "sell Primes into installations where more horsepower is needed."

■

CXI, Inc. of Palo Alto, Calif., will report this week the signing of five multimillion-dollar contracts for its line of

See **NEWS** page 6

DEC to offer powerhouse top-end VAX

By James Connolly

MAYNARD, Mass. — Digital Equipment Corp., which only seven weeks ago announced its high-end VAX 8650 superminicomputer, Wednesday is expected to unveil a mainframe-class system code-named Nautilus, several sources told *Computerworld* last week.

Nautilus, to be known as the VAX 8800, will displace the 8650 and its predecessor, the VAX 8600, at the top of DEC's product line. DEC will continue to produce the 8600, 1,000 of which have been installed, and the 8650, which DEC has promised to deliver by early March.

DEC officials declined comment on the speculation surrounding the announce-

See **DEC** page 6

AT&T cuts loss, axes Net 1000

By Elisabeth Horwitt

After spending approximately 10 years and $1 billion trying to make Net 1000 profitable, AT&T has pulled the plug on the value-added packet-switched network. The service will be terminated by June 1 for existing customers.

The choice was "a prudent business decision," according to AT&T spokesman Barry Campbell. "Net 1000 just wasn't meeting our corporate profit objectives."

Campbell debunked one current industry theory that Net 1000's demise resulted from regulatory clashes with the Federal Communications Commission. He said it failed "because a market just never devel-

See **AT&T** page 4

IBM unveils RISC system

RT PC 32-bit workstation runs under Unix version

By Charles Babcock

NEW YORK — Seeking a hold on yet another fast-growth market, IBM last week unveiled its first 32-bit workstation, the RT Personal Computer. Shunning standard components that competitors have adopted, IBM's system is built around proprietary reduced instruction set computing technology and offers optional compatibility with the IBM Personal Computer AT.

System/36 boosted, page 12; DP RISC potential debated, page 15.

The multiuser system uses an expanded version of AT&T Unix System V but provides limited mainframe communications capabilities and lacks an IBM Token-Ring network connection.

IBM expects the RT PC line, priced from $16,485 in a typical base configuration, to compete with other 32-bit workstations in the engineering and computer-aided design and manufacturing markets and to become a multitasking network machine in small businesses and corporate departments, said Robert M. Williams, general manager of IBM's Engineering Systems Products, during the Tuesday announcement in New York.

The long-expected product received mixed reviews. Workstation vendors such as Apollo Computer, Inc. and Sun Microsystems, Inc. said the IBM product does not offer any price or performance challenge (see related story page 9). But some analysts viewed the announcement as a strategic thrust that could dramatically affect the workstation market.

The machine's operating system, Advanced Interactive Executive, was devel-

See **IBM** page 8

CW EXCLUSIVE

On the road: Laptop users charge ahead, industry stutters

By Eric Bender

A long series of disappointments in the 16-bit laptop microcomputer market was capped last Tuesday when IBM did not announce its expected entry. But existing products have attracted a loyal following among field personnel who use the lightweight machines to increase productivity greatly, according to managers interviewed by *Computerworld*.

First shipped more than three years ago, 16-bit laptop micros never began to reach the multibillion-dollar sales volumes that vendors and researchers once confidently predicted for 1985. The leading vendor, Grid Systems Corp., sold only about 15,000 machines to U.S. customers last year, according to Future Computing, Inc. figures. Analysts blame the shortfall on hard-to-read screens, high prices, lack of IBM Personal Computer compatibility and other drawbacks.

Hopes for laptop sales increasingly have been pegged to the expectation that IBM would plunge into the market and play its familiar role in stimulating demand for the product, as the Personal Computer did for microcomputer sales. Those hopes soared last week amid widespread expectations that the Internal Revenue Service would award IBM a contract for 15,000 laptops and that the company would unveil finally its long-expected "Clamshell" or "PC

See **LAPTOP** page 10

Multimate site licensing killed; Microsoft to offer volume sales

Industry turns attention to corporate pricing plans

By Douglas Barney and Maura McEnaney

Just one month after finalizing its acquisition of Multimate Corp., Ashton-Tate will terminate the Multimate site licensing program, effective Feb. 1. Former customers and those currently negotiating for a Multimate site license, however, will continue to be supported.

The decision, coupled with the upcoming announcement of Microsoft Corp.'s corporate licensing program, has refocused attention on the clamor by large corporations for site licensing and volume purchasing options.

Although Microsoft's program will not be formally announced for 30 to 45 days, the firm is already presenting it to some corporations, said Jerry Ruttenbur, vice-president of retail operations for Microsoft.

Volume purchases, no duplications

The Microsoft program involves volume purchases of $100,000, $250,000 or $500,000 worth of products during the course of a year but allows for no duplication except for maintenance updates, which include such things as new printer drivers. However, when unauthorized copies of Microsoft products are made, corporations will only be liable for the suggested retail price of those products.

Unlike Microsoft, Ashton-Tate is still struggling to define its overall corporate pricing plans, but Ashton-Tate President Ed Esber has repeatedly indicated that his company will come out with a volume purchase plan sometime soon. "My goal is to have something in the second quarter," Esber told *Computerworld* last week.

The Multimate site license program garnered lots of attention but few customers, according to Esber. Currently, only eight companies have signed on with Multimate, and another nine companies are in the final stages of negotiating site licenses.

Ashton-Tate plan differs from Multimate

Ashton-Tate's plan, when announced, will differ significantly from the current Multimate plan, according to Karen Orton, director of marketing programs.

Under the curreot Multimate plan introduced in February 1985, users can elect for volume discounts on purchases of more than 250 copies or pay a licensing fee for a set number of copies with or without documentation.

Multimate's plan would have been difficult to implement through Ashton-Tate's established dealer base, Orton said. "A site licensing deal takes a long time to negotiate, and that doesn't work well with dealers. We are more of a dealer-oriented company," she said.

Lotus readying site licensing program

Lotus Development Corp. is also readying a site license program for release later this year. Site licensing "has got to be the biggest issue that faces Lotus in 1986," said Bruce Rogers, public relations manager for Lotus.

Although a site licensing program from Lotus is far from imminent, the firm has been experimenting with a system at Exxon Corp. under which a copy of the program resides on the customer's mainframe and a set number of copies can be downloaded by users [CW, Jan. 20].

One advantage of this system is in distributing product updates. "It is a pretty simple fix in that it goes to a central source, and you eliminate the cumbersome methods of sending out individual copies," Rogers said. Having the program reside on the mainframe also gives the vendor and corporation greater control over product distribution, Rogers added.

More software for less money

A key advantage of both site licensing and volume purchasing programs is the ability to purchase more software for less money.

"The licenses we have literally saved us millions and millions of dollars compared with the deepest discounts you would normally expect on a per-copy basis. We are safely over 90% off list price," said Thomas J. Buckholtz, office technology project coordinator for Pacific Gas & Electric Co. in San Francisco.

In addition to price breaks, large-scale site licensing and volume purchasing programs allow corporations to standardize on software packages, more effectively control the use of software and streamline the software ordering and distribution process.

Better relationship with vendor

In fact, Ashton-Tate's Orton is not convinced that corporate accounts want volume discounts from site licensing. "Underlying it all, a lot of companies want to have a better relationship with the vendor," she said.

Other vendors agree that reasons other than price are just as pressing. The ability to receive product enhancements quickly and at little or no cost is a high priority of large corporations, said Michael Crosno, vice-president of marketing for Computer Associates International, Inc.

Corporations "have a real strong desire to keep their users current," Crosno said. Under Computer Associates' site licensing plan, however, discounts off list price can reach 75% to 80%.

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We can't be everywhere — but our readers are.

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With companies reporting an average return on investment of 200%, MRP II software may well be the answer to manufacturing automation. This Product Spotlight examines how to evaluate and select an MRP II system, discusses major vendor strategies and presents a comprehensive guide to products/ **35**

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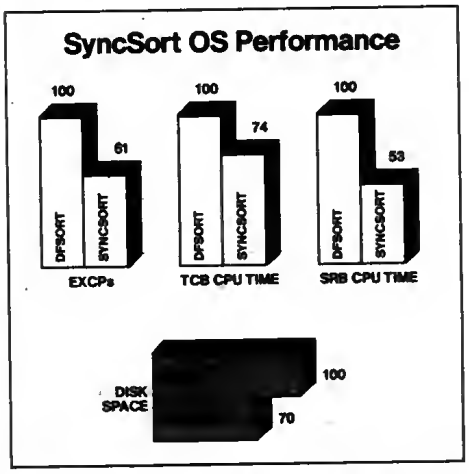

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Enmasse unwraps first transaction processor

Top Unix-based E/CS supports over 700 users

By Rosemary Hamilton

ACTON, Mass. — Enmasse Computer Corp., a 2-year-old start-up firm, rolled out its first product last week, a Unix-based transaction processing system that it said can be expanded to support up to 768 users.

The entry-level Enmasse Computer System (E/CS) costs $60,000 and supports up to eight users. A more typical configuration of 48 users would cost $148,000, and the maximum configuration, which sells for $1.96 million, includes associated software such as a data base management system and application development tools. The product is currently shipping.

The system was designed as a low-cost alternative to IBM, Tandem Computer, Inc. or Stratus Computer, Inc. equipment used in the transaction processing market, according to Michael Simon, vice-president of marketing.

E/CS operates under an Enmasse-enhanced version of AT&T Unix System V. It uses a multiprocessor architecture that divides the processing functions into three separate processors: the application processor that processes programs, the file processor that stores the data base and the I/O processor that provides the terminal interfaces.

The applications processor and I/O processor are in the same cabinet and are connected to the file processor via a dedicated Ethernet bus.

Each applications processor contains either a Motorola, Inc. 68010 or 68020 processor, a memory management unit and up to 8M bytes of memory. The I/O processors, which have 64K bytes of local memory each, also share the application processor's logical address space.

The file processor, stored in a separate cabinet, can hold up to four tightly coupled Motorola 68000 processors, each with 1M byte of on-board memory.

Enmasse did not release a transaction-per-second measurement, commonly used to indicate computing power in this market. Instead, Simon said the system computes approximately 100 logical file references per second. Transactions typically vary in the number of file references they use.

AT&T cuts loss, axes Net 1000

From page 1

oped for that kind of enhanced service."

The decision was overdue, according to Joaquin Gonzalez, program director for the strategies in telecommunications service at Gartner Group, Inc. "AT&T never understood what the customers wanted," he said.

Net 1000 suffered an identity crisis from Day 1. Originally dubbed Advanced Communications Systems, it was both a public packet-switched data network and a time-sharing bureau.

In addition to long-distance, packet-switched network links between businesses and their customers and branch offices, Net 1000 offered to house clients' data bases and to run data routing and location applications on computers installed at its network nodes.

Net 1000's customer base remained small and even decreased as businesses found more cost-effective solutions. The service reportedly had approximately 20 client companies three years ago, when the name was officially changed to Net 1000.

Norwest Mortgage, a former Net 1000 customer, brought its networking applications in-house within the last year. The Minneapolis mortgage company began using Net 1000 services in early 1984, with a long-term project to make mortgage plans, current interest rates and other pertinent information available to some 75 branch offices and 500 banks with which it did business [CW, July 9, 1984].

Each day, Norwest compiled the data on the company's IBM 4341 mainframe and transmitted it to a Net 1000 mainframe. Users could access the data by making a local call to the nearest Net 1000 packet-switching station.

By early last year, Norwest had phased out its Net 1000 connections. Cleo Green, the company's vice-president of data processing, said, "In March, we were using three or four different ways to do the same thing. We already had a private IBM CICS network. We discovered it was cheaper to use CICS instead of Net 1000 to link our own sites. The project to set up links with banks was initiated during a big growth period. A year and a half ago we cut back tremendously, and we cut that project as well."

The multitude of companies like Norwest that need to link remote workstations to IBM mainframes are prime targets for IBM's Information Network. The Tampa, Fla., service's offerings are similar to Net 1000's with one important exception: Where Net 1000 was ready to link any combination of computers, the IBM Information Network specialized in linking IBM computers.

Gonzalez of Gartner Group said IBM has a competitive edge because most end-user networks are IBM Systems Network Architecture (SNA) networks, and customers trust IBM's SNA expertise.

Market share statistics for 1984 tell a different story, however. Analysts at Link Resources Corp. said that in 1984 revenue from Net 1000 was a depressing $2.5 million. IBM Information Network revenue was nearly double that amount at $4.5 million. But the total value-added network market revenue in 1984 was $285 million, dimming the distinction between AT&T and IBM.

IBM shows no signs of abandoning the service. "Both 1984 and 1985 were significant growth years for the network in terms of physical facilities, revenue and customers," Syd Heaton, vice-president responsible for the IBM Information Network, said last week. "We doubled our business in 1985 alone."

Last year, Information Network took over an IBM computer center in Irving, Texas, and another in Carry, N.C. By the end of last year, the network had more than 100 local dial-up access node cities, and the Insurance Value Added Network, the service's largest project to date, connected more than 30 insurance company host systems with more than 3,000 agents.

Even with Net 1000 scratched from the lists, AT&T remains a contender in the value-added network arena. Campbell said the company will be announcing new financial transaction services during the year. Current AT&T value-added network offerings include the People Express Airlines, Inc. voice-response network system and an electronic mail service offered to some large businesses.

AT&T still plans to go through with the joint network development project that Net 1000 negotiated last summer with a consortium of 16 Japanese businesses.

"Net 1000 was just one application among many within AT&T Information Systems," Campbell emphasized. "We're still going full steam ahead with the others."

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NAS ups throughput by 12.5% for AS/8000 processors

By Jeffry Beeler

MOUNTAIN VIEW, Calif. — National Advanced Systems Corp. (NAS) last week reportedly boosted by 12.5% the internal throughput of the three smallest members of its AS/8000 processor family.

Affected by the increase in processing power are the firm's AS/8023, 8043 and 8053, all of which have had their times cut from 40 to 35 nsec, according to NAS worldwide systems Marketing Director Carl Claunch.

For users who have yet to acquire one of the three processor models, the increased speed is now available as a standard feature at no extra cost.

Retrofit to models in field

In addition, the improvement in performance can be retrofitted to any AS/8023, 8043 or 8053 already in the field, Claunch said.

If an existing system has been converted to support Extended Architecture, the field upgrade is free of charge, he added.

The company said the increase in the three processors' throughput was necessary to keep the machines in step with the user community's rapidly growing performance needs.

NAS views the IBM-compatible AS/8000 family, which consists of five models and spans a performance range from the 4381 Group II to the 3081 Model K, as a migration path for users of 4341 Group II-class systems.

At first, the NAS line was reportedly well positioned for customers who had outgrown the capacity of their existing 4341s. But with performance demands in that sector growing 35% to 40% per year, the low end of the AS/8000 eventually became too small for its target users and had to be sped up accordingly, Claunch said.

Only one

Third party computer maintenance company provides quality service for more than 400 product types (the nearest competitor services a mere 50).

So

DEC top-end VAX to debut

From page 1

ment. However, a DEC engineer involved with the company's high-end development projects said Nautilus will be announced this week. A Boston-based market research firm concurred.

In addition to the 8800, DEC reportedly will announce two mid-range systems that will fit between the Microvax II minicomputer and the 8600 in the market served by the previous generation VAX-11/750 and VAX-11/780. The larger of the two mid-range systems was code-named Scorpio and will be known as the 8300, while the second will be known as the 8200.

Yankee Group analysts predicted that the 8800 will provide two to three times the processing power of the 8600 and 32M bytes of main memory.

Based on those estimates, the 8800 will be rated at 8.8 to 13.2 million instructions per second (MIPS). That 13.2-MIPS rating would surpass the 10-MIPS performance of DEC rival Data General Corp.'s high-end MV20000 Model 2 dual processor, which is scheduled for spring delivery.

Although the 8800 reportedly would be targeted initially to the scientific and engineering market, the performance figures also would place it in a classification with IBM's second-tier general-purpose mainframe line, the 3081 family.

Analysts at the Yankee Group predicted that the three new systems will use a bus architecture that DEC will introduce this Wednesday, the Backplane Integrated, or BI, Bus.

TOP OF THE NEWS

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PCOX micro-to-mainframe communications products with Quadram Communications Products, Softsel Corp. and three other vendors. CXI will supply Quadram of Norcross, Ga., with IBM 3270 emulation tools for distribution under Quadram's Mainlink brand name.

■

IBM teamed up with Measurex Corp. last week to develop computer-integrated manufacturing software for IBM computers, taking another step in its aggressive plans to penetrate the factory automation mart. "IBM is trying to leverage third-party capabilities into sales for themselves," said Susan McGarry, an analyst with the Yankee Group in Boston. IBM said the deal is "another statement of our commitment to factory automation."

■

Theodore R. Josephs, who oversaw Honeywell's Multics operating system, has joined Phoenix Computer Products Corp. as chief executive officer. Phoenix, based in Norwood, Mass., sells software to micro manufacturers so their products can run applications software designed for the IBM Personal Computer line. A Honeywell spokesman claimed there was no connection between Josephs' departure and Honeywell's recent decision to phase out Multics.

COMPUTERWORLD

To Our Readers:

You may have noticed that some of our sections have changed position within Computerworld. This is part of our ongoing effort to better serve you, the reader.

Our **Computer Industry** section will now begin on the next to last page and will read toward the front of the newspaper. This change has affected our **Classified** section: where **Position Announcements** formerly began the **Classified** section, it will now appear next to **Computer Industry. Classified** will now begin with **Buy-Sell-Swap.**

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Donald E. Fagan
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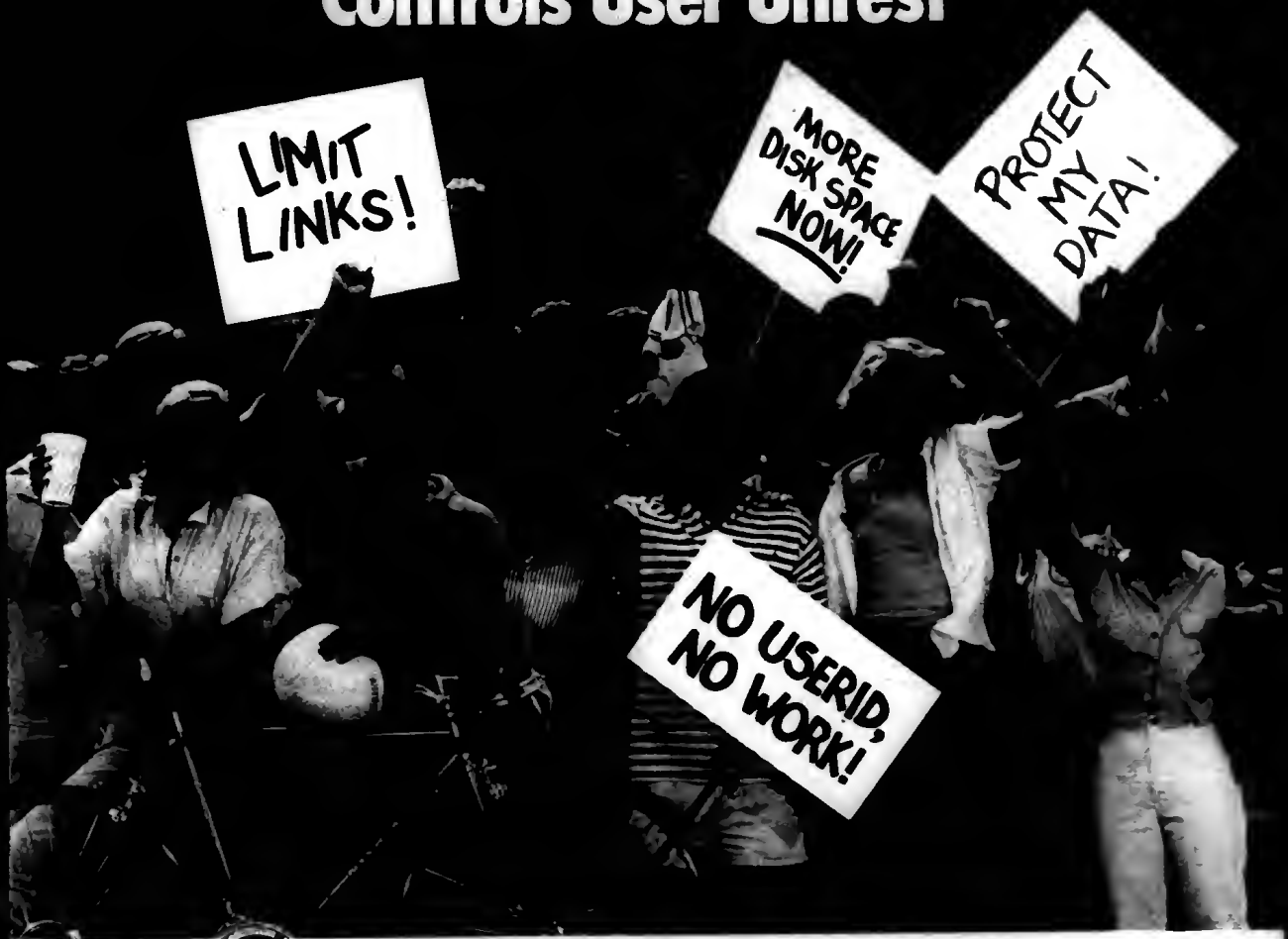

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IBM joins 32-bit fray with RT line

From page 1

oped in cooperation with Interactive Systems Corp. AIX is an expanded version of Unix System V and doubles to one million lines of code the usually hefty Unix operating system, according to Frank King, who is the head of the RT Personal Computer development team in Austin, Texas.

Interactive Systems also developed IBM's IX/370 operating system, a Unix-based system that runs under VM. An IBM senior product administrator said late last week that it would be logical for IBM to seek a direct communications link between the AIX and IX/370, but he would not comment on whether such a product is under development.

RT PC connects to the IBM PC Network through an optional adapter card and BIOS software, plus user programming. No products were offered to connect the RT PC to the Token-Ring, although IBM said selected universities will be experimenting with token-ring-connected RT PCs.

The RT PC's 32-bit microprocessor unit was developed over an eight-year period at IBM laboratories. It includes 118 RISC instructions, compared with a more typical computing set of 200 to 300 instructions. The processor runs in 170-nsec cycles and is capable of processing between 1.6 million and 2.1 million instructions per second, Williams said.

The microprocessor is teamed with a memory management unit chip that has a 40-bit memory-addressing capability, giving the RT PC user up to one trillion bytes of virtual storage.

IBM also offered an SQL-based relational data base management system for the RT line. SQL/RT Data Base, priced at $1,000, provides "broad compatibility" with the SQL/DS DBMS for the DOS/VSE and VM operating systems, IBM said.

■

The RT PC was viewed by Michael Geran, an IBM analyst at E. F. Hutton & Co., as "another IBM iceberg announcement," in that only the tip of the product's capabilities was being revealed.

> ***"An IBM analyst viewed the RT PC as "another IBM iceberg announcement," in that only the tip of the product's capabilities was being revealed.***

But Geran questioned whether IBM would initially be able to sell the RT to its targeted market because of its pricing. Configured with a CAD/CAM engineering package, the price would approach $40,000, he said.

Frederic Cohen, an analyst with L. F. Rothschild, Unterberg Towbin, said the RT PC was too much of a "me-too" product, borrowing heavily from Unix as other vendors have done but trying to sell users on its own enhanced version. The graphics and networking capabilities of the RT PC "did not shine" compared with competing products, Cohen said.

■

Continuing the policy credited with spurring sales of the Personal Computer, IBM spokesmen said the RT PC has an open architecture to encourage third-party vendors to add functions. The low-end Model 10 has six feature slots, five for RT PC options, 16-bit Personal Computer AT option cards or Personal Computer 8-bit option cards. The Models 20 and 25 each have eight expansion slots, six for Personal Computer AT or Personal Computer options; the additional slots support only 8-bit options.

The RT PC uses a Personal Computer AT bus, allowing attachment of Personal Computer and Personal Computer AT peripherals and features. A $995 Personal Computer AT Coprocessor Card and a $550 coprocessing program, both from IBM, allow many Personal Computer AT and Personal Computer programs to run concurrently with and under control of the 32-bit central processor.

IBM's PC-DOS and AIX can run concurrently on the RT, but because they share operating memory, hard disks and displays, the RT will run PC-DOS more slowly than the 16-bit Personal Computer AT, Williams said. A 512K-byte AT memory expansion will speed execution of PC-DOS, according to IBM.

The RT can serve as a host terminal for a network with seven ASCII terminals or micros attached, and applications may be shared on the network. The RT PC and connected terminals may only communicate with an IBM 370 host through asynchronous RS-232 communications or IBM 3278 Model 79 emulation.

All models have one hard disk drive; 40M bytes or 70M bytes; and one 5¼-in., 1.2M-byte Personal Computer AT floppy disk drive. Storage can be expanded to a maximum of 210M bytes of hard disk and 2.4M bytes of floppy disk storage. Main memory ranges from 1M byte to 4M bytes. Also available is a ¼-in., 55M-byte streaming tape drive and an $850 floating-point accelerator.

The three models of the RT PC will retail for between $16,485 and $19,730, with discounts available on orders of four or more. The discount on a 20-unit order is 27%, dropping the prices to between $12,023 and $14,403, IBM said. The prices do not include the machine's $3,400 operating system. Model 10 and 20 will be available in March, and Model 25 and A25 will be available in September.

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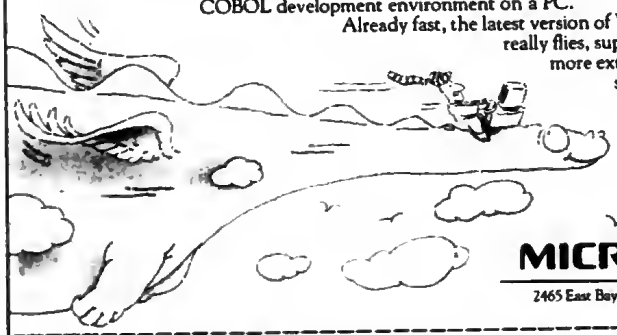

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Workstation vendors claim IBM's RT PC poses no threat

Analysts warn product marks only the first step

By Rosemary Hamilton

Breathing a collective sigh of relief, the major engineering workstation vendors claimed that the IBM workstation announced last week does not pose a serious threat because it offers neither a price nor a performance advantage over their products.

Industry analysts, however, consider the RT Personal Computer to be the first in a series of steps that IBM will take into this market, and, therefore, the vendors' feelings of relief should be only temporary.

"This is just the first salvo in IBM's plan to penetrate the entire workstation market," said Edmund Spelman, technology analyst at Oppenheimer & Co. in New York. While Apollo Computer, Inc., Sun Microsystems, Inc. and Digital Equipment Corp. may have the technological advantage now, "IBM wants this market in a big way," he said.

Nevertheless, the major competitors expressed little concern when contacted last week. At Apollo, Vice-President of Marketing Edward Zander issued a prepared statement that said the company felt "pretty good" after the RT announcement and that IBM "failed to recognize the importance of integrated graphics, user interfaces and networking technology."

But some analysts suggest that of the three major vendors, Apollo could suffer the most from IBM's presence, mainly because the Chelmsford, Mass.-based company has run into hard times lately. "Let's face it. Apollo has DEC pounding them from one side, Sun from below and now IBM from the other side," Oppenheimer's Spelman said. "They have their work cut out for them." Analysts consider DEC, with its huge installed user base, and Sun, with its aggressive pricing, to be in more secure positions.

These two vendors, however, consider their technology, particularly in graphics and networking, to be their major assets. Thomas Himes, a spokesman for Sun, said the RT had "less than half our floating-point performance," and, based on customer feedback, he said, "floating-point performance is essential." He also said the RT "looks more like a big PC than an engineering workstation."

William Steul, group manager of engineering systems at DEC, said there were no surprises in the IBM announcement and added, "We don't see it as a direct threat."

However, analysts suggested that the vendors will have a tough fight down the road because IBM is determined to get its piece of the workstation pie. "It won't knock the others out of bed," said Kenneth Bosomworth, president of International Resource Development, a market research firm in Norwalk, Conn. "But they are going to lose market share. The RT may not be that much better, but it sure is pretty good."

Software debuts for IBM RT PC

NEW YORK — Coinciding with last week's introduction of the RT Personal Computer, IBM announced it will market several proprietary and third-party software packages for the machine.

IBM announced the following system programs for the RT PC:

- IBM Computer-Integrated Electrical Design Series/Design Capture, IBM's first circuit design automation package. The RT version will be out in the third quarter for $8,000.
- Personal Graphics, a high-level, $1,000 application programming interface. It will be available in March.
- Inmail/Innet/File Transfer, a $625 message and data sharing program. It will be available in March.

Third-party packages to be marketed by IBM include the following:

- IBM Professional Computer-Graphics Augmented Design and Manufacturing, from Cadam, Inc. The package is compatible with IBM mainframe Cadam Interactive Design Release 19.2 or later software. It will be available in the third quarter for $15,000.
- RS/1, a data management program licensed from Bolt, Beranek & Newman, Inc., will be available in April for $5,500.
- Uniras, from Uniras, Inc., a set of 11 programs for graphically displaying data. Programs are priced individually from $1,595 to $7,650 and will be available in June.
- Workstation Publishing Software, from Interleaf, Inc. of Boston, an icon-based and mouse-driven text management program. It will be available in March for $1,995.
- Applix IA, from Applix, Inc. of Boston, another icon-based, mouse-driven package. It will be available in September for $1,995.
- Samna Plus, from Samna Corp., Atlanta, an integrated text and spreadsheet reporting system. It will be available in June for $1,295.

— Charles Babcock and Rosemary Hamilton

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The next 3 chapters introduce DL/I data base processing in interactive programs using IMS/VS data communications features (on MVS systems only) or CICS (under either MVS or VSE). This section *won't* teach you how to write interactive programs, you'll need other training for that (for CICS, you can use our 2-part series described below. IMS DC programming will be covered in *IMS, Part 2*, available later this year). If you already have CICS experience, though, this section will teach you *everything* you need to know to process DL/I data bases in your CICS programs.

The last 3 chapters cover advanced material about DL/I data base organizations and access methods. Here, you'll see complete character and hex listings of DL/I data bases with 4 different organizations — material that's not available anywhere else (including in the IBM manuals). As you study these listings, you won't just learn the mechanics of data base organization. You'll also start to understand what your system is doing when you process certain types of data bases. And that means you'll be able to write more efficient DL/I programs.

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Software Publishing adds graphics package to Harvard line

Product is firm's third business-oriented entry

By Peggy Watt

MOUNTAIN VIEW, Calif. — Software Publishing Corp. widened its Harvard business software line with what it calls an all-in-one graphics presentation program, Harvard Presentation Graphics, introduced last week.

The $395 package, which the firm said will be available in March, includes six chart formats, ten type fonts, limited text editing and color selections. It runs on Microsoft Corp. MS-DOS machines only.

"We're presenting our software as the single, most complete package for presentation," said Tess Reynolds, project manager. The target user is a professional who wants to create quick, attractive presentation charts, she said. "It's what we'd call specialty productivity, but full featured."

The selection includes an organization chart that places boxes rather than requiring drawing, with a zoom capability for showing or printing only parts of a large chart.

A chart editor allows graphics enhancement by drawing or text entry. Graphics are displayed in color on computers equipped with a Hercules Computer Technology Co. graphics card, IBM Enhanced Graphics Adapter card or IBM Color Graphics card.

Harvard Presentation Graphics imports spreadsheet data from Lotus Development Corp. tools directly and reads files from Software Publishing's PFS:Graph and from most other similar products, Reynolds said.

Harvard Presentation Graphics is Software Publishing's third entry in its business-oriented Harvard line, following the Harvard Project Manager and its successor, Harvard Total Project Manager. The company, better known for its PFS: family of low-end products, has said it will continue to support those earlier programs but wants to establish a second line in corporate computing.

Laptop computing set for growth

From page 1

Convertible" machine.

Although neither event occurred, an IRS official, who declined to name the contract winner, said the agency hopes to make the announcement by the end of this month.

Despite all the ongoing industry uproar, however, companies already have placed thousands of laptop machines with employees who spend a lot of time on the road, and many firms report highly encouraging results.

Measured by the number of audits carried out, "our productivity has increased 10% to 50% over a year's time," said Roy Fisher, premium audit technical service executive at Fireman's Fund American Life Insurance Co. in San Rafael, Calif.

While there was some early resistance a year ago as Fireman's 170 auditors were equipped with Hewlett-Packard Co. 110s, "it all has died out," Fisher said. "Now they say, 'Take my wife, my house, my car, but don't take my 110.' "

Companies that purchase only desktop micros, while sales representatives do their main work in the field, give the wrong message to their customers and their own staff, commented Pacific Bell's Tony Lloyd. "They're in the wrong place deploying the right technology."

Changing this approach can bring large benefits in high-tech sales, claimed Lloyd, who is branch manager for Pacific Bell's major accounts marketing group for the San Francisco Bay area. "When the account executive and the sales manager can demonstrate the technology competently to a customer, you have a synergy that really starts to drive sales and revenues."

At Pacific Bell, Lloyd estimated, the use of about 15 Grid Systems Corp. machines saves his 110-person group 40 or more hours a day.

Many employees now end up working at home for a few hours over the weekend. "The decision to come in to work over the weekend is a big decision, particularly if they have a family," but putting in a few extra hours at home to solve a problem may make a lot of sense, he said.

At Fireman's, sales personnel handling casualty insurance initially give a cost estimate, and auditors later return to get actual numbers for billing. The auditors work "seated on pickup trucks or at the top of skyscrapers — anywhere the insured keeps books," Fisher noted.

Auditors enter the data, using the Lotus Development Corp. 1-2-3 software built into read-only memory, and then transmit it to the billing center. Among the benefits are that "we can always read their writing," Fisher pointed out wryly. Additionally, when an auditor returns a year later, he does not have to start from scratch.

Before settling on the HPs, Fireman's evaluated several transportable designs, such as the Compaq Computer Corp. Portable. "But we had people who couldn't get them in the back of their cars — they couldn't lift them," Fisher said.

At San Francisco-based Chevron Chemical Co., which has bought about 90 HP laptops, "they've been requested faster than anything else I've seen so far," MIS manager Don Matto said.

The machines have found diverse roles at Chevron. In one group that sells chemical additives, two worldwide travelers who formerly carried suitcases full of printed information now pack a laptop, diskettes and HP's Inkjet printer. The micro also permits them to exchange electronic mail messages with the home office, minimizing time-zone problems, Matto said.

In another division that sells fertilizer products, the laptops are primarily used by sales representatives who access corporate data bases. "They're now totally accepted, from the vice-president of the division down to the troops," Matto said.

While corporate customers agree on many aspects of what would make an ideal laptop — including a readable screen, light weight, low price and almost unlimited battery-powered operation — they have chosen different trade-offs among product features.

Some emphasize the need to accept IBM Personal Computer software standards. "IBM compatibility was the No. 1 requirement," said David Sanger, supervisor of office automation support at Ford Motor Co. headquarters in Dearborn, Mich. Ford, which bought roughly 100 Zenith Data Systems Corp. Z-171s last fall, wanted that feature "so that people don't have to run proprietary software and can use the same disk media on their laptop as in their office."

However, HP 110 users pointed to the advantages of read-only memory-based applications, including simplicity of operation and faster loading. And when machines are out on loan, "we don't have to lose sleep about losing the software," commented Chevron's Matto.

In a related issue, customers evaluated minifloppy vs. microfloppy drive configurations in different ways. From a technical point of view, microfloppies have it all over the larger designs, but they do not run the thousands of off-the-shelf IBM packages. While Ford did not rule out microfloppy drives, "certainly the 5¼-in. media was a plus," said Sanger's superior, Richard Bania, manager of Ford's corporate office productivity center.

Some customers decided that battery operation was not mandatory, but others decided that they did not want their field personnel wasting time looking for an outlet. "The minimum was at least an hour of battery operation," Sanger said, voicing a common conclusion that ruled out power-hungry gas-plasma displays.

Users liked the low cost of LCD screens but disliked their readability problems. "The screen was about the only complaint" about the HP 110s and HP 150s from users after more than a year in the field, Matto said.

"We want to assemble two or three people around the laptop and have the Ford employee demonstrate something," Sanger commented. That required a 25-line by 80-col. screen easily read in normal lighting conditions over a 25- to 30-degree viewing angle, he commented, and he expects the Z-171's backlit LCD to allow that.

Others, however, decided differently. "We will not use anything other than a plasma or electroluminescent screen because you'll go blind in about 30 seconds," Lloyd maintained.

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Boston	Jan 14, Feb 11, Mar 11
Chicago	Jan 15, Feb 11, Mar 13
Cincinnati	Jan 14, Mar 4
Cleveland	Feb 12
Columbia,SC	Mar 11
Columbus	Jan 15, Mar 5
Convent Station, NJ	Feb 13
Dallas	Jan 14, Feb 25
Dayton	Feb 11
Denver	Jan 15, Feb 13, Mar 13
Des Moines	Mar 19
Detroit	Jan 9, Feb 18, Mar 13
El Paso	Feb 4
Ft. Worth	Mar 11
Grand Rapids	Jan 23
Halifax	Jan 15, Mar 19
Houston	Jan 9, 21, Feb 20, Mar 20
Indianapolis	Mar 11
Iselin, NJ	Jan 23, Mar 20
Jacksonville,FL	Jan 15
Kansas City	Feb 5
Lansing	Mar 11
Little Rock	Feb 81, May 13
Louisville	Feb 26
Los Angeles	Jan 14, Feb 11, Mar 13
Milwaukee	Feb 19
Minneapolis	Mar 27
Montgomery,AL	Feb 20
Montreal	Feb 18
Nashville	Jan 16
New Orleans	Feb 13
New York City	Jan 8, 22, Feb 5, 18, Mar 11, 19
Newport Beach	Jan 16, Mar 18
Oklahoma City	Feb 11
Omaha	Jan 23
Ottawa	Jan 9, Feb 13, Mar 13
Philadelphia	Jan 16, Mar 20
Phoenix	Jan 30, Mar 27
Pittsburgh	Feb 20
Portland	Mar 4
Quebec	Feb 19
Rochester	Jan 30, Mar 18
Sacramento	Feb 11
St. Louis	Feb 13
Salt Lake City	Jan 28
San Antonio	Jan 15
San Diego	Feb 13
San Francisco	Jan 14, Mar 11
Seattle	Feb 4
Sunnyvale	Feb 6, Mar 11
Syracuse	Feb 20
Tampa	Jan 16
Toronto	Jan 7, Feb 4, Mar 4
Tulsa	Jan 28
Vancouver,BC	Jan 16, Apr 22
Washington	Jan 8, 22, Feb 12, Mar 5, 19
Winnipeg	Feb 5
Winston-Salem	Mar 27

System/36 enhancements boost IBM's office campaign

More memory, storage, user support available

By James Connolly

NEW YORK — IBM continued its bid to battle minicomputer vendors in the office market last week by boosting features of its System/36 line.

The company announced added user support, memory capacity, on-line storage and communications capabilities for its System/36, including personal computer emulation of IBM 3270 terminals.

The 2½-year-old minicomputer line, which IBM has identified as the key to its office strategy, may still fall short of the performance and pricing standards set by Digital Equipment Corp., Wang Laboratories, Inc. and other mini vendors, according to analysts. However, one analyst said that IBM is closing the gap on those other vendors.

'IBM doesn't have to sell parity'

"The gap between IBM and the minicomputer companies had gotten too great in terms of office offerings. They had to do something to narrow it. But you have to remember that IBM doesn't have to sell parity. It doesn't have to match the performance and pricing of the other vendors," said Steven Milunovich, an analyst for First Boston Co.

Several of last week's announcements centered on Release 4 of the SSP operating system that runs in the three System/36 models. IBM also introduced two printers for intermediate systems and a streaming-tape system.

With the addition of a field-installed controller, IBM doubled the user support for the high-end System/36 from 36 to 72 terminals. Maximum disk storage was increased from 800M bytes to 1.4G bytes, and internal memory was increased from 1.75M bytes to 2M bytes. The mid-range 5362 now supports 28 users, rather than the previous 22.

Memory in the System 36/PC, also known as the 5364, increased from 512K bytes to 1M byte with the maximum number of users being increased from four to six. IBM also enhanced support for personal computers attached to the System 36/PC, including use of up to 640K bytes of main storage in the personal computer and enhanced host graphics support.

Gwen Peterson, an analyst with Dataquest, Inc., added, "Basically the announcements were all things that had been limitations in the 36."

She noted that the memory increases will boost performance somewhat and that the additional connections may not hurt performance for many customers because those who need 50 or 70 terminals will have many of those terminals idle most of the time.

Changes in the operating system were intended to support the additional memory, storage and user volumes as well as communications, according to IBM.

SSP Release 4 includes the Distributed Host Command Facility, which allows an operator in an IBM 370 environment to command a System/36 to run an application or, more commonly, to perform diagnostics. Release 4 also provides Display Station Pass-Through, under which System/36 users can sign on and run programs on another local or remote System/36 rather than receive a copy of a file as was previously allowed.

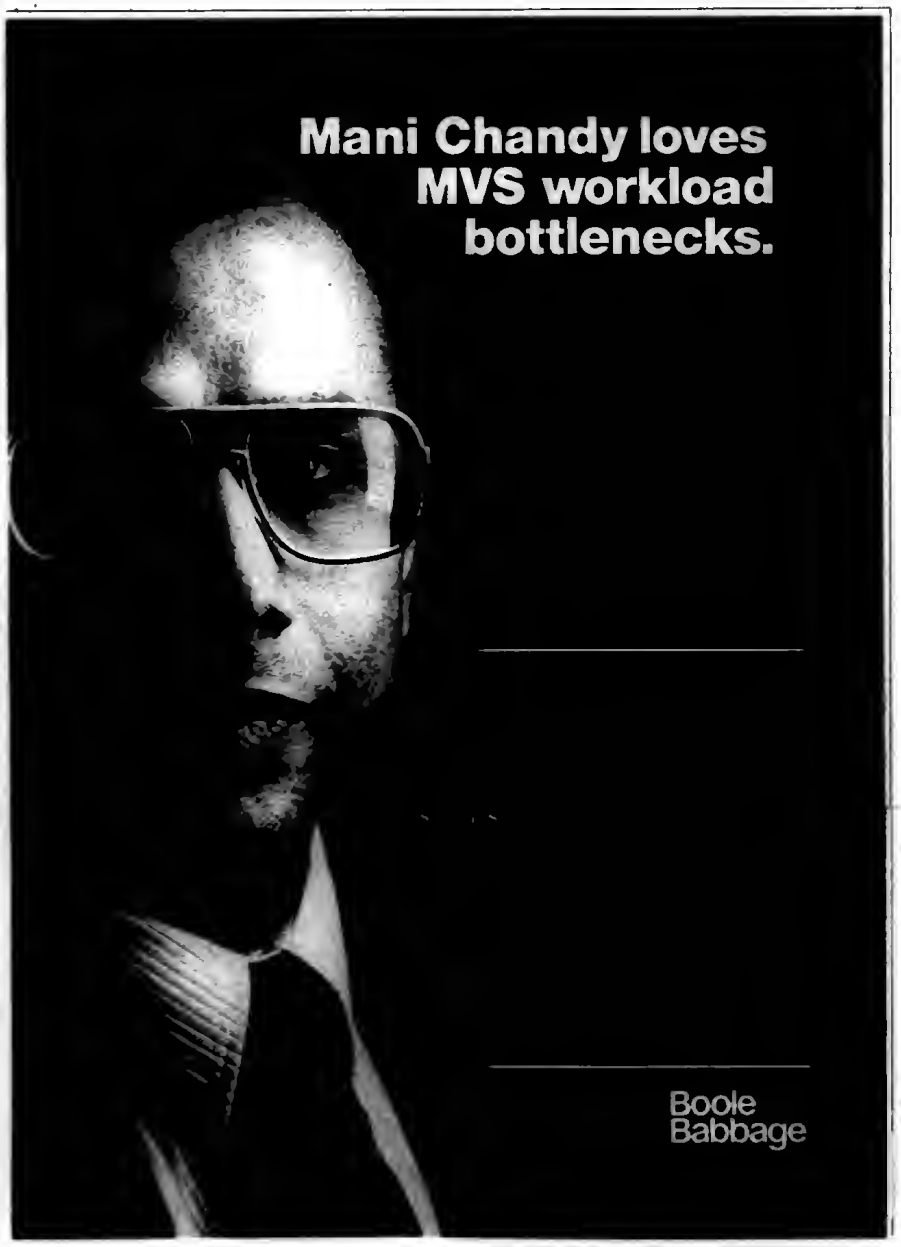
Other features of Release 4 include the following:

- The ability to process tapes created on IBM DOS/VSE systems.
- Storage of screen formats in main memory rather than on disks.
- A software-controlled disk cache area of 1K to 6K bytes.
- Security improvements such as limits on incorrect password attempts.
- Additional support for IBM's Displaywrite/36, Personal Services/36, PC Support/36 and Query/36.

Release 4 is available now at no charge to 5360 and 5362 users with current SSP licenses and for $4,000 to new customers. It will be available in February for 5364 users at $995 for new customers.

The 3270 capability enables an IBM Personal Computer to emulate an IBM 3278 Model 2 or 3279 Model 2A terminal and communicate through a System/36 with host systems, such as the IBM 4300 and 3030, 3080 and 3090 series, with the System/36 appearing as an IBM 3274 controller. The emulation allows the micro to use up to 960 one-character input fields and 24 function keys. It works under IBM Systems Network Architecture with hosts running IBM MVS, DOS/VSE, IMS and CICS but not VM. Other limits include four colors and no host-to-Personal Computer file transfer. For the 5360 and 5362 the emulation option costs $2,250; the price is $900 for the 5364.

In other software announcements, IBM introduced Business Graphics Utilities/36 and the IBM Enhanced 5250 Emulation Program Version 2.1. The graphics utility, which supports business graphics comparable to those of the System/38 and mainframe systems, costs $320 for the 5364 and $800 for the larger System/36 models. Version 2.1 of the emulation program provides additional graphics and printing functions and



costs $845, IBM said.

Hardware prices for the 5360 range from $65,350 to $111,850. A 358M-byte disk drive costs $18,000, or $14,000 when it replaces a 200M-byte disk. A 512K-byte memory upgrade for the 5360 costs $2,500. The new models will be available in February. For the System 36/PC, the 1M-byte storage feature costs $1,000.

The new printers include the 4224 serial dot matrix printer for the System/36 that uses printer memory to merge text, color and graphics on the same page. It is said to print up to 400 char./sec.

The second printer, the 4234 Dot Band printer, features a 4-ft metal band that moves in a loop between two rotors with a 44-hammer assembly hitting a dot every 1.2 msec. The technology allows random selection of dots to be hit as the band spins, so dots wear evenly, according to IBM spokesmen. Print quality and speed are variable, from 120 line/min for near letter quality to 300 line/min for data processing and 410 line/min for draft quality.

The 4234 Dot Band printer will be available in April for $8,800. The 4224 can be configured in three models, two of which are available now and the third in April, with prices ranging from $4,200 to $6,700.

Also introduced was a ¼-in. streaming-tape drive designed to back up 40M bytes of data in 15 minutes. The 6157 tape drive will be available for the 5362 in February for $800, the 5364 in the third quarter of 1986 for $650 and the 5360 in late 1986 for $1,200.

Amdahl broadens Unix-based UTS line

First System V in native mode on 370 debuts

By Jeffry Beeler

SUNNYVALE, Calif. — Amdahl Corp. last week broadened its UTS product line with the release of what the firm claims is the industry's first AT&T Unix System V implementation to run in native mode on IBM 370 architecture mainframes.

In a related move, the supplier of IBM-compatible CPUs also expanded its 6280 line of disk systems to include four additional models that reportedly boast 40% greater storage capacity than the family's existing members.

The Unix-based UTS/580 operating system is said to be the first system control program offered on a 370 architecture machine by a vendor other than IBM. Previous UTS releases have always been required to run as a guest operating system under IBM's VM. The same applies to IBM's Unix look-alike, IX/370.

Amdahl announced a pricing structure for UTS/580 that ties the operating system's monthly license fee to the model of processor with which it is configured. Amdahl said it intends to offer the UTS/580 only with its own 580 series mainframes and will not offer the software for the 580's IBM equivalents.

Aimed primarily at engineering and scientific users, UTS/580 is the latest Unix offering from Amdahl. The firm has been offering UTS — its own version of Unix — in one form or another since 1981 and just a year ago announced a System V implementation.

Unlike the earlier versions that operated under VM, UTS/580 can operate on a 370 architecture machine in native mode, according to Charles Gitomer, Amdahl product programs manager.

The latest version of Amdahl's Unix can also run as a guest under IBM's VM/SP or VM/SP High Performance Option and works with Amdahl's Multiple Domain Feature.

When operating in native mode, UTS/580 provides 25% greater performance than earlier UTS implementations simply because it dispenses with VM and its high overhead requirements, Gitomer said. The elimination of VM as a host operating environment also reportedly simplifies system maintenance and installation procedures.

UTS/580, unlike earlier UTS versions, also supports Ethernet. Gitomer said that will enable 580 series processors to be networked with workstations operating on Ethernet.

UTS/580 supports full screen operation on ASCII terminals and a multiple-session capability, neither of which is available with existing UTS implementations, according to Fritz Trapnell, Amdahl's vice-president of systems products. The full screen feature gives ASCII devices, like micros, the same display characteristics as IBM 3270 dumb terminals, while the multiple-session capability allows users to switch back and forth among applications without requiring several CRT terminals.

At first, Amdahl said it plans to aim UTS/580 mainly at customers like AT&T, the regional Bell holding companies and the federal government. But with time, the company said it intends to widen the product's user base to include large engineering firms, according to Bill O'Connell, Amdahl's senior vice-president for corporate strategy.

UTS/580 will initially be available only on Amdahl mainframes operating in the traditional 370 mode.

Amdahl said that it intends periodically to upgrade UTS/580 to reflect AT&T changes to Unix System V, said Donal O'Shea, director of the company's UTS market development.

Depending with which model of the 580 processor line it is coupled, UTS/580 ranges in monthly license fee from $4,000 to $20,000. Shipments of the operating system begin during the second quarter of this year.

The four additional disk systems models, meanwhile, cost the same as existing 6280 family members, even though the quartet's storage capacity has grown from 317M to 441M bytes, O'Shea said.

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Third-party servicer urges vendor boycott

Pushes products from cooperative vendors

By Clinton Wilder

SAN DIEGO — The president of a growing third-party maintenance company last week urged fellow service firms to steer their customers' businesses away from computer vendors that do not provide parts and documentation to third-party service companies.

In a provocative presentation at the second annual Frost & Sullivan Conference on Third Party Maintenance, Technical Support Services, Inc. (TSSI) President Thomas McLaughlin called on service firms to urge their customers not to buy parts from uncooperative vendors. McLaughlin said such users should buy IBM products because Big Blue does cooperate with third-party providers under the terms of the 1956 Consent Decree.

"IBM fights to keep its service dollars, but at least it is fair about it," McLaughlin told an audience of about 250 attendees. "Other companies just don't care; they won't even compete. We have already turned two customers away from non-IBM companies. If a company won't let you service their machines, work like hell to keep them out of your customers' shops."

McLaughlin's idea of a boycott drew a predictably mixed reaction. "I don't think that's the solution," said Jayne M. Bunting, marketing manager for third-party service in Sperry Corp.'s international division. "McLaughlin's telling everyone to give IBM more business, but what about the Consent Decree? That's not cast in stone; it could be revoked at any time." IBM has petitioned the U.S. Department of Justice to review the decree, claiming that it is no longer needed.

One third-party maintenance customer said the choice of an equipment vendor must be made by the user, not the service company. "We have gotten rid of some uncooperative vendors, but their products were not key to our business," said Ray Lamberson, contract administrator for Sandia National Laboratories in Albuquerque, N.M. "It has to be up to the user. That's where the administrative decisions are made."

Ossining, N.Y.-based TSSI, an independent servicer of terminals, automated teller machines and point-of-sale systems, said it has been frustrated in its attempts to obtain parts and support data from NCR Corp. and Diebold, Inc. Other leading vendors, including Wang Laboratories, Inc., Hewlett-Packard Co. and Sperry have also declined to do business with third parties for competitive reasons [CW, Oct. 21].

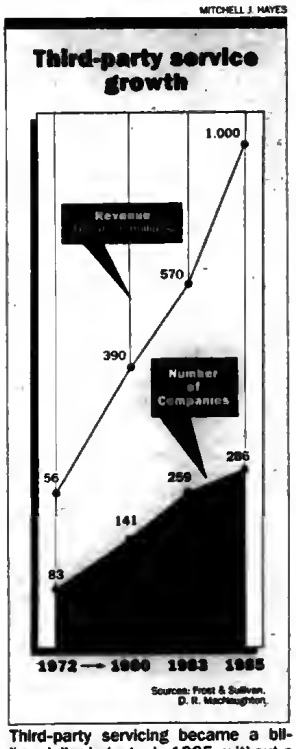
Vendors "should be required to cooperate; it's a matter of what's right," McLaughlin told *Computerworld*. "The vendors are just hiding behind the fact that no one will litigate this, but I'm going to raise hell about it." The issue became a recurring theme of the two-day conference, erupting into several tense exchanges between vendor executives and third-party representatives.

"I think it's a very shortsighted policy on the vendors' part," said Joe Baron, vice-president and general manager of storage gear service firm Datamemory Corp. in Woodland Hills, Calif. "It's a young industry and everyone is very jealous of their prerogatives. Even though the major vendors are new and established, third-party service is new to them."

Virtually every major hardware vendor has fueled the competition in the last three years by servicing equipment other than their own. "I think the BUNCH companies are skating on the edge of antitrust problems by refusing to cooperate," said conference Chairman D. R. MacNaughton of Business Development International, a Franklin Lakes, N.J., consulting firm.

But the hardware vendors said they will fight hard for the same service dollars coveted by independent maintenance firms. "We don't feel a great need to help our competition," said Paul Thurman, director of third-party maintenance for NCR. Thurman said NCR's goal is to earn 10% of its service revenue on non-NCR equipment by 1990.

MITCHELL J. HAYES



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Pagetec settles piracy lawsuit

By James A. Martin

PHILADELPHIA — Pagetec, Inc. of Westlake Village, Calif., has reached an out-of-court settlement in its $3 million civil lawsuit against a Philadelphia scientific publishing firm and a New York-based typsetting concern accused of illegally duplicating copies of a Pagetec software program. Terms of the Jan. 17 settlement were not disclosed.

Pagetec filed its suit Oct. 4 in U.S. District Court in Philadelphia, alleging that the Institute of Scientific Information (ISI) publisher engaged in breach of contract and trade secret misappropriation in its software licensing agreement with Pagetec. The suit claimed ISI provided Ralph Garner Associates, the typesetting firm, with an unauthorized copy of Pagetec's Versacomp data base publishing program [CW, Oct. 14].

The FBI said it is continuing its investigation into the case. Criminal indictments against Ralph Garner and ISI President Eugene Garfield have been anticipated for some time, but a spokesman for the U.S. Attorney's Office said no charges have been filed and declined further comment.

The settlement was reached four days before a scheduled Jan. 21 trial with U.S. District Court Judge Thomas O'Neill. The trial had been set for Jan. 6 but was postponed.

Business RISC: Commercial use questioned

IBM endorsement divides observers

By James Connolly

ANALYSIS

The endorsement of reduced instruction set computing (RISC) by IBM last week underscored the question of whether RISC may be useful for applications in the corporate DP world rather than in science and engineering.

Several industry observers interviewed following IBM's workstation announcement (see story page 1) remained divided on the merits of RISC in the commercial DP environment. Proponents pointed out that IBM has previously used RISC in the I/O processors for its 3090 mainframes, while a handful of small companies have had a slight impact, and Hewlett-Packard Co. is expected to introduce its RISC-based Spectrum product line in March.

First Boston Co. analyst Steven Milunovich said he expects to see RISC architectures used in commercial areas, particularly in light of the Spectrum announcement. He noted, "All the users really care about is price and performance. They don't care what technology is behind that performance." However, he and other analysts observed that commercial applications are more oriented toward I/O than are technical, computationally intensive applications, and RISC architectures may not favor a heavy I/O work load.

IBM indicated that commercial DP applications for its RISC technology have not been ruled out. "You should look at this as a strategic announcement for IBM. We developed our own technology. It was well thought out, well planned and strategic," noted Robert M. Williams, general manager of IBM's Engineering Systems Products Independent Business Unit. "There could very well be other uses for RISC in IBM. I don't think there are any fundamental things that would preclude you from using RISC in a commercial DP environment."

Williams emphasized that the IBM RT Personal Computers are capable of doing general-purpose computing, and some of the target markets are the financial field, where actuarials and economists work, and the publishing market.

International Data Corp. analyst Frank Gens said the instructions used in computation for technical applications are often 2 or 4 bytes long and can be executed in one machine cycle, while I/O instructions may run to 8 bytes and use several cycles, complicating the RISC approach.

Gens also noted that the RT PC may not be a true RISC machine or may illustrate that RISC "isn't a black-and-white issue." He said that, while the RT PC with 118 instructions has about half the instructions of a complex instruction computer, it is still more complex than the 20-instruction RISC machines being delivered by small companies.

Gens predicted that RISC will continue to show up in specialized processors that may not need all of the instruction set.

However, Dataquest, Inc. analyst Hal Feeney noted that IBM began its RISC effort with research in the commercial field and that HP's Spectrum is planned as an across-the-board commercial DP machine.

Meanwhile, Milunovich added that another portion of the IBM announcement could have a lasting impact in the commercial DP world, with that impact being made by Unix. He noted that half the code in IBM's AIX Unix implementation was written by IBM and Interactive Systems Corp. with the intent of making Unix easier to use. He said that effort could mean significant changes were made to the operating system and that IBM's use of this implementation could solidify Unix's position in the mid-range field.

Yankee Group analyst Thomas Henkel said his company believes the future is uncertain for RISC in the IBM world. "We pretty much agree here that IBM is sending up a trial balloon with the RISC workstation. If it sells, IBM will look for other ways to use it," Henkel said.

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VIEWPOINT

EDITORIAL

Another victory for users

The battle is over, and the customers won.

Granted, we will see many further skirmishes between users and vendors as they wrangle over site licensing for microcomputer software. However, pioneering agreements like those disclosed earlier this month by General Electric Co., which gave the corporate giant unlimited copying rights for several packages on its 20,000 microcomputers, reveal the outlines of the victory ahead.

From the customer's point of view, the logic is clear: The ultimate deal gives rights to users for unlimited copying for business uses within their firms worldwide.

Clearly this typically translates into very, very attractive pricing. But customers say the advantages go far beyond cost.

"This was a move to simplify things as much as to save money," according to one GE official. It avoids requirements such as tracking each package by serial number, he added. "That's too complicated, too cumbersome . . . You don't need to make a federal case out of this."

Site licensing, however, *has* turned into a federal case.

The debate is a curious one that does not fit neatly into a standard business case study and that elicits analogies that never quite fit. Is micro software a commodity product? Will it be sold like mainframe software? Coffee beans? Cabbage Patch dolls? Videocassette recorder movies?

Many vendors are frightened half to death by site license demands for some understandable reasons. How can they manage their businesses if they lose control of the distribution and use of their products? From the vendor's point of view, it's hard to imagine a more bottom-line concern.

One of the major issues, of course, is the role of computer dealers who don't want to be cut out of this lucrative market. Vendors just can't afford to anger dealers unnecessarily.

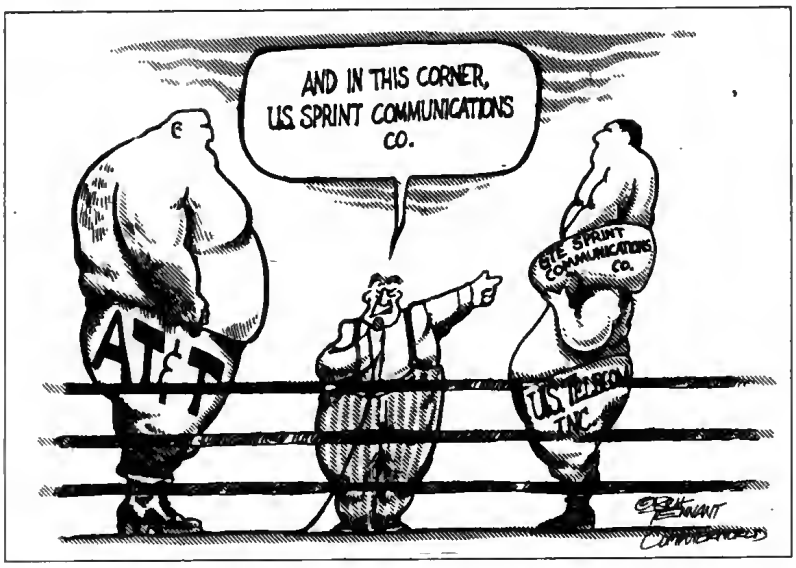
But as the services once provided — at least in theory — by dealers have shifted to internal staffs, corporate customers see fewer and fewer reasons to buy through dealers. There are exceptions among "key dealers" who do offer many specialized services to corporate customers and may be cut in on site licensing deals.

Trying to find their way out of this maze, vendors are showing different levels of responsiveness to their customers and testing different technical and marketing approaches. Among these, Lotus Development Corp. is looking at distributing software electronically from a central computer at the customer site, although the potential customer benefits from that setup don't seem overwhelmingly clear.

IBM, the largest software vendor of all, refuses to consider granting customers unlimited copying privileges, saying that it would lose all control of its assets. That may change, however, as other vendors begin using site licensing deals to attract big customers.

The ground is shifting in software licensing and use. Already, all but the largest suppliers are withdrawing copy protection, and almost all suppliers have dropped the requirement for key disks.

The move toward site licensing is accelerating. At least in the long run, the customer is always right.



LETTERS TO THE EDITOR

Relational controversy blurs issue of whether DBMS will get job done

It had to happen, sooner or later. The controversy about relational vs. all other data base management system models and products has been raging beneath the surface for several years. The unfortunate thing is that it has surfaced in a negative no-win debate between two highly respected leaders in the DBMS world.

E. F. Codd's articles "Is your DBMS really relational?" were interesting, informative and well written. They probably should have stopped short of focusing on two DBMS products while ignoring several other competitors whose relational characteristics are questionable.

Cullinet Software, Inc. President John Cullinane's reaction is the understandable response of someone who is justifiably proud of a product that has been highly successful. As a long-time user of IDMS/R, I am irritated by Codd's comparisons too.

We must, however, move beyond the emotions of theory and marketing hype. Relational implementations are here to stay. In time, relational DBMS will solve many, if not most, of our data structuring and handling requirements.

From an end-user standpoint, however, I am less concerned about the esoterics and purity of an approach than I am about getting the job done. As David Richardson so aptly put it in a letter to the editor [CW, Dec. 16], "The main goal for corporate users is for all of their applications to be supported by the same DBMS at the same time with acceptable performance."

This is the bottom line. I really don't care what kind of engine is under the hood if it drives the car.

Larry Towner
Los Angeles

DECUS coverage too negative, according to symposium attendee

I feel compelled to comment on *Computerworld*'s recent coverage of the Digital Equipment Corp. Users Symposium (DECUS). First, on a positive note, let me compliment you on the fact that there was coverage of this event. All too often I have looked in vain for any mention of DECUS, which I consider to be a significant users meeting.

Second, I was surprised at the mildly negative tone of the two articles [CW, Dec. 16]. My systems manager and I met with and talked to many other attendees of the symposium. We found the mood to be quite positive regarding where DEC is today and where it seems to be heading.

Third, DECUS is a users' symposium — not just a forum for DEC product announcements, as your articles seemed to suggest. As you may know, DECUS is run by a largely volunteer group of users who do an outstanding job of putting on almost 1,000 clinical sessions in five days plus dozens of presymposium seminars.

I do not think your coverage reflected the many positive and significant things that went on at DECUS or DEC's technical achievements in many different areas. Along with many others, I was impressed by the architectures that DEC has put into place and the increasing integration of its software products.

Although its pricing policies still need some improvements, as was suggested in one of your articles, I feel DEC have made considerable improvement as a company over the last two years.

David Lorenzen
Manager of information systems
Catel Telecommunications

Sloppy semantics perpetuate myths about micro-mainframe links

In the article "Micro-to-mainframe links" [CW, Dec. 30/Jan. 6], it said, "an open architecure link . . . is not likely soon, if at all." It followed with a few words deploring "vague definitions of micro-mainframe links."

Perhaps there is a semantics problem here. In reviewing the article, I concluded that open architecture referred to a product that would not be limited to "access only to data residing on that same vendor's mainframe software."

See **SLOPPY** page 18

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COMPUTERWORLD

IBM users confused by net reversal

'Get tough,' DPers urged

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80. Manufacturer of Computers Computer-Related Systems or Peripherals
85. Computer Service Bureau/Software/Planning/Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
75. User Other _____
85. Vendor Other _____

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22. Director/Manager of Operations/Planning/Admin Serv
23. Systems Manager/Systems Analyst
31. Manager/Supervisor Programming
32. Programmer/Methods Analyst
89. OA/WP Director/Manager/Supervisor
88. Data Comm. Network/Systems Mgmt
41. Engineering/Scientific R&D/Technical Mgmt
51. Manufacturing Sales Reps/Sales/Marketing Mgmt
86. Consulting Management
76. Medical/Legal/Accounting/Mgmt
88. Educator/Journalist/Librarian/Student
80. Other _____

3. COMPUTER INVOLVEMENT (Circle all that apply) Types of equipment with which you are personally involved either as a user vendor or consultant
A. Mainframes/Supermins
B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems

3317-8604

VIEWPOINT

The new paradigm for MIS services

By Wayne Smith

To succeed at applications development and maintenance, information services must master three fundamental processes: representation, validation and management.

Representation consists of identifying and understanding the problem to be solved and then embodying it in a disciplined, rigorous and unambiguous manner.

The process is complex. For a representation to be useful, it must hold the same meaning as the original problem. Yet, it must retain only the context needed to preserve the structure and relationships of that problem such as month-end reports after all daily transaction updates. Extraneous context must be discarded.

Called the essence of programming, representation is a continuous process that is carried out throughout the applications development life cycle, level by level, until the level of implementation is reached. At each level, a new representation of the original problem is created.

With current technologies, only the representation levels closest to implementation can be effectively automated. For example, the compilation, assembly and load module execution steps are often carried out without human intervention at all.

Smith is vice-president, specializing in quality, at Applied Information Development, Inc. in Oak Brook, Ill.

However, at the highest levels of representation, the analyst is left with only a scattering of primitive tools and, even worse, no clear analytical technique.

Only in the last few years have quality-improvement researchers tackled the most difficult and elusive of all programming enigmas — how to represent the business problem nestled within its real world context and dynamics in a way that can be unambiguously and rigorously understood by a computer.

QUALITY

The management question in most MIS organizations is the single most important one to be addressed.

Resisting automation almost entirely is validation. It is the process of determining whether a given representation at one level is equivalent to a given representation at another level. In other words, validation tells us whether we carried out the representation process properly.

The process of developing a system or making a change to an application consists of a sequence of representation validation steps in which each representation attempts to refine the prior representation, and the corresponding validation attempts to answer the question, "Did we do it right?" The validation process at one level assists the representation process at the prior level.

Our understanding of the validation process historically has lagged behind even our understanding of the representation process. We often wait years after we develop a representation method or tool to develop even basic strategies for determining whether we have used it properly.

Ensuring that the representation and validation processes are carried out on the right problems, at the right times and in a predictable manner is the essence of management. Of the three fundamental processes critical to information services, management has received the least attention. After all, motivated people with the right tools don't need management.

In fact, the management question in most MIS organizations is the single most important one to be addressed. Only recently are MIS-quality programs recognizing that the technical tools and analytical methods with which our industry as a whole is so preoccupied are truly effective only within the context of a sound management process. Much of what we know about the management of applications development or maintenance is derived from the older disciplines of engineering and manufacturing.

A closer analogy might be found in the case of an artist attempting to render a sculpture under the commission of a patron. In applications de-

See NEW page 18

Producing state-of-the-art graduates

By Richard K. Fox

Faced with rapid and continuing changes to technology, the MIS industry increasingly relies on higher education for competent entry-level personnel. Can the curricula of these institutions keep up with the requirements of modern organizations for graduates who can quickly become productive members of the MIS team? Given the limited budgets and faculty resources of the colleges and universities offering MIS programs, can these institutions provide the state-of-the-art hardware and software facilities needed to produce these graduates?

A few have very large budgets or have entered into agreements with one or more vendors that will supply them with the latest products.

For the vast majority of schools, of course, the question of how to provide state-of-the-art facilities is a very real and serious one. To answer this question, we must define "state of the art."

Most people would understand the term to mean the very latest, just released hardware and software products, and they would include the latest concepts or techniques appearing in the research journals.

Fox is an instructor and consultant of microcomputer-based MIS in North Kingstown, R.I.

However, since we are not dealing in a laboratory-like research environment but rather in the practical business world of commercial MIS, it would be more helpful to view "state of the art" as the latest advances already in use in the most progressive, risk-taking organizations.

READER'S PLATFORM

Significant differences in these two understandings of the term will have great effects on an MIS program, its orientation and the usefulness of its graduates. In the first instance, the school must attempt to shape the MIS curriculum to stay one step ahead of the industry, and it will be forced to acquire quickly the latest hardware and software from vendors.

In the second and infinitely more practical approach, the school will strive to keep pace with major industry trends and to shape its curriculum so that graduates will have the required skills, perhaps slightly behind the needs of the most advanced companies, but right on time for the requirements of the majority. This course of action also requires curriculum change and adaptation but nowhere near the degree of the first choice, and it does not require the absolute latest hardware and software to be effective.

Does having outstanding hardware and software facilities mean that the graduates of the MIS program will be better equipped to become productive professionals? The availability of good facilities simply makes it easier for a good faculty using a relevant curriculum to help produce good graduates. What may be important, although not from a teaching standpoint, is the identity of the manufacturer of the equipment available. This, of course, is significant because hiring organizations often require familiarity with the type of systems they use.

Let's consider whether industry needs a pool of graduates at the forefront of information systems concepts and technologies as some have suggested. Are most companies ready for this type of graduate, if the academic world could manage to produce them? I doubt if they are.

What is needed by the industry are graduates well grounded in the underlying theory and basic concepts of information processing, systems analysis and design and programming. These students must be provided with the base of knowledge and practice to enable them to adapt to a wide variety of MIS environments,

See PRODUCING page 18

A plea to stop using 'user'

By C. M. Durhan

According to the dictionary, a user is "one who uses, one who exploits for personal gain; a drug addict." The connotations here are not very complimentary; in fact, they are derogatory at best.

End user. Interesting concept once again. Does end user mean one who uses an end? And what type of end might that be?

READER'S PLATFORM

User friendly. Here we go again — friendly only to users? Ever see a terminal or personal computer sneer, snicker or snort at a passerby? Define "friendly."

User-friendly documentation. Did you ever open up a manual and have a three-dimensional pop-up figure shake your hand?

These users that are read about and talked about and laughed about must be owned and operated by data processing — they have to be. Do these users need to be fed, walked and played with regularly? What is happening here? Where is the professionalism, the respect?

How could documentation be DP friendly but not user friendly? Isn't systems or software documentation read by both factions? Both DP and those user people use the documentation. Then, does user-friendly documentation reference the user of the documentation or the user of the system or process discussed? It seems we could be putting both groups on equal ground then, doesn't it?

Are terminals or microcomputers only used by those users? Programmers and analysts do maintenance, testing, upgrades as well as functional and technical audits. You mean they actually need to use the system?

Because DP and non-DP personnel read and reference documentation, operate equipment and run programs, what is there to distinguish the DP professional from the user? Both camps use the system to a different degree.

User has become a convenient term that pops up in our everyday vernacular — but it is not very palatable to the targeted audience. Go ask a few people for their opinions.

Why can't we restore some dignity to the intended party? Actually, looking at many seminar and lecture topics, the words "user," "end user" and "user friendly" could easily be left out of the titles without major impact or without changing the intent.

There are ways to change the tone but not the meaning — Reference "ease of use" instead of user friendly. Describe reference manuals rath-

See PLEA page 18

Durhan is a consultant in the human resources division of GPU Service Corp. in Parsippany, N.J.

Sloppy semantics perpetuate myths

From page 16

In categorizing micro-to-mainframe products, many authors have used the term "generic link" to refer to products whose mainframe extraction capabilities are not limited to only one architecture.

There are, and have been for some time, a number of products that meet this definition in two possible ways: vendor-specific products whose mainframe software itself is capable of reading many different formats and products from companies that market no mainframe data base management system product.

Access to data on the mainframe side of the link is certainly a key requirement for the product; it does not, however, tell the whole story. In this market, the degree of support necessary from DP personnel is also of critical importance.

Some of the available products are not particularly friendly or transparent and require some setup by programmers for each application. Some seem easy but require knowledge of the mainframe products to be used effectively.

Others mediate between the naive user and the data, once the storage has been created.

It is a shame to see myths perpetuated. The micro-to-mainframe market has suffered from ineffective marketing for some time now. It has not done very well selling its technology, but there is no need for us to continue the job.

Merv Adrian
Fourgen Information Systems
New York

Multics demise cues recollection

In regard to the article about the Multics cancellation, "Honeywell phasing out Multics line" (CW, Jan. 13), the Multiple high-end processor project was to be implemented by "skunkworks," recalling, perhaps, the efficiency and success of the Lockheed Corp. SR71 effort.

At code-naming time, a team member invoked the name of the skunk from *Bambi*. The rest is history.

E. N. Kittlitz
Marlborough, Mass.

New paradigm for MIS services

From page 17

velopment, we are to produce only one copy, and it must meet the expectations not of some generic customer but of a specific individual or group of individuals, all of whom are integral to the solution.

The goal should be to define a new paradigm of information services as consisting of the three fundamental processes of representation, validation and management. Each requires a separate set of strategies tailored to its particular characteristics if we are to advance our ability to deliver high-quality data and applications to our users.

A plea to stop using 'user'

From page 17

er than user manuals. Or try tutorials, procedure manuals or manager guides.

A user-friendly manual is useless if it is not grammatically correct, graphically accurate, well written, organized and legible.

Put a stop to the reference of the term "end user." Try instead — functional representative, operator or processor of information specialists.

Let's stop abusing the user by ceasing to use "users."

Producing graduates

From page 17

and they must be equipped with attitudes that allow them to understand an ever-changing high-tech industry and to adapt technological breakthroughs to provide ever more cost-effective MIS to achieve organizational goals.

The MIS industry is beginning to mature and, as a result, to split into a number of specialized areas, much as engineering and other disciplines have done. For MIS higher education to be effective, it may be time for colleges and universities to adapt the same approach and begin to specialize in their educational program offerings. This type of program focus will ease the difficulty of staying current with industry advances and requirements.

There certainly exist a number of problems in the world of MIS higher education.

But, curriculum shortcomings are not a result of the lack of the latest hardware and software; instead, they are caused by a lack of understanding of the real needs of the computer industry regarding entry-level requirements. A few schools are trying to address the problems of MIS education effectively by cooperating more closely with major computer-using organizations in defining requirements and programs designed to develop well educated and well prepared graduates.

DB2 The Myth & The Reality.

Anytime a new technology breaks, you'll find great controversy surrounding it. And inevitably a great deal of mythology. And so it is with DB2.

IBM's announcement of DB2 has the computer world discussing it as, a product rich in function, yet questionable in performance. One easy to use, yet lacking an application generator. One providing a sound base for query operations, yet lacking referential integrity support.

The uncertainty and confusion over DB2 has truly become mythical in relation to the reality.

★ Where is DB2 now?
★ Where is DB2 going?
★ Why will DB2 get there?
★ Why are there potential benefits with DB2?
★ Why should DB2 be an integral part of your long range systems plan?
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SYSTEMS & PERIPHERALS

HARD TALK
James Connolly
CW Senior Editor

Seeking trusty DP scorecards

Land surveyors have it comparatively easy. They peer through the lens of a theodolite — their telescope on a tripod — and then calculate acres and square feet.

Doctors have it easy, too. Their patients step on the scales, and then the physician figures a ratio between inches and pounds and says, "Lose some weight."

Data processing managers are the ones with the tough job. They cannot take a ruler or a set of scales and measure million instructions per second (MIPS). They cannot even define MIPS. So, every day, at least one DP manager or consultant calls *Computerworld* to inquire about the newspaper's annual Hardware Roundup, a collection of charts showing some of the specifications, such as memory capacities and MIPS ratings, for several hundred types of computers.

A typical call comes from a DP manager who wants to compare products sold by two or more vendors. And, typically, the inquiry is focused on the line dealing with relative performance in each Hardware Roundup chart.

When it was developed a decade ago, the relative performance system was meant to help managers compare systems produced by IBM and IBM plug-compatible manufacturers. It was intended to provide a single number by which the manager could judge competing systems. As originally developed by International Data Corp. and adopted

See SEEKING page 23

Wang betters service record

Engineer training, remote service centers credited

By James Connolly

LOWELL, Mass. — When talking about the importance of customer service, Ray Cullen raises the example of a business in the southern U.S. where there are 154 terminals for 154 employees.

"If their computer goes down for two hours, that company goes out of business for two hours," said Cullen, senior vice-president for customer service at Wang Laboratories, Inc.

Cullen is the man responsible for repairing Wang's reputation in the field of customer service, a field where even Cullen concedes Wang had a shoddy record a few years ago, particularly when the company's sales outran its abilities to fix and maintain systems.

Recent interviews with users of Wang equipment revealed that the efforts to improve service have borne fruit, although weaknesses remain.

"Wang service in the past has been . . . poor would be a good statement, and it probably would be complimentary to say it was poor," said Larry Barger, owner of Practical Business Systems, Inc., a Columbus, Ohio, consulting firm. "But over the past four or five years here in Columbus, we have had a couple of good technicians. What I do is try to get those technicians assigned to my Wang accounts, so that has pretty much alleviated my service problem.

"Wang has a better training procedure now than they did. They are sending their people to school, and they have a better staff, a more stable staff. Some of the ones they had before are still here, but they aren't assigned to my accounts, and that is fine with me," Barger added.

A Miami user noted that she has had

See WANG page 22

Sequent adds 30-processor system

By Donna Raimondi

BEAVERTON, Ore. — Sequent Computer Systems, Inc. rolled out a 30-processor parallel computing system last week that it is targeting to universities, software development organizations and government/military markets.

At the same time, Sequent announced a new release of Fortran that includes code generation, optimization and register utilization enhancements said to improve overall performance by 10% to 40% over the company's older Fortran package.

The Balance 21000 computer system broadens the price/performance range and the overall capacity of the company's parallel system, according to Rick Gimbel, Sequent's manager of product marketing. The Balance 21000 product will allow the company to address larger, more end-user-oriented types of customers.

Sequent's former high-end system, 54 of which were installed at customer sites as of the end of 1985, Gimbel said, was a 12-processor unit geared more to OEMs than to end users. "Our customers are learning to do one of two things — either to use more parallel applications, which means they need more processors, or to add more users." The new system is set to be shown at the Uniforum conference in Anaheim, Calif., on Feb. 4 but will not be in production until July.

The increased number of processors is a significant move for Sequent, said Omri Serlin, analyst at the Itom International consulting and research group in Los Altos, Calif. "The bus is a single resource that all processors must use, and how

See SEQUENT page 23

INSIDE

Fujitsu blames fluctuations in the Japanese yen for price increases/22

NEW THIS WEEK

- Teleray introduces a terminal offering Honeywell emulation
- For more on this and other new products, see pp. 75-90.

INSTANT ANALYSIS

"I think you should look at our reduced instruction set computer announcement as a statement that IBM believes the technology provides high performance for low cost."

— **Robert M. Williams, general manager of IBM's Engineering Systems Products Independent Business Unit**

Accon rolls out laser printer

LX 8219 compatible with IBM daisywheel

By James Connolly

LONG BEACH, Calif. — Accon Computer Co. recently introduced a letter-quality laser printer said to be plug compatible with IBM's 5219 daisywheel printer when attached to IBM's System/34, 36 and 38.

Accon also announced laser printer sharing devices and an ink-jet printer for those same IBM systems.

The LX 8219 is built around the Hewlett-Packard Co. Laserjet printer. According to an Accon spokesman, the printer differs from earlier laser printers available for the IBM minicomputers in that the LX 8219 eliminates software compatibility problems and printer escape codes.

The printer attaches to the computer through twinaxial cable and is configured as a 5219.

The LX 8219 is said to print up to 8 page/min while featuring a noise level of less than 45 dba and a paper capacity of 450 sheets.

Available fonts include courier medium, bold, italic and line printer. Accon claimed that the printer supports IBM software such as Text Management and Displaywrite/36.

It costs approximately $7,000 and will be available in February.

The laser printer sharers, the Accon PS 500 for large systems and the Accon PS 300 for small systems, reportedly allow up to five computer systems to communicate with an individual Laserjet. The PS 500, featuring five RS-232 inputs and one RS-232 output, costs $595. The PS 300 reportedly features two RS-232 and one parallel input and one RS-232 output. The PS 300 costs $495.

Accon also announced the LJ-150, an ink-jet printer based on the HP Think Jet printer. It reportedly can be configured as an IBM 5225 printer for use with the Systems/34, 36 and 38. It costs $1,995.

Filenet pockets deals fo year-old optical disk document manager

By James Connolly

COSTA MESA, Calif. — Filenet Corp., a manufacturer of optical-disk-based document management systems, last week announced that it has signed contracts worth $4.5 million for its systems.

Filenet officials said the systems, which scan documents and manage their passage from terminal to terminal and to storage in a jukebox-style optical-disk subsystem, have been shipped to customers including Security Pacific National Bank and Home Savings Bank in Los Angeles and the Bureau of Health Statistics for the state of Utah in Salt Lake City.

David C. Seigle, vice-president of marketing for Filenet, also said Filenet has OEM contracts with various companies, including AT&T, involving its Optical Storage and Retrieval (OSAR) system, the jukebox-style subsystem.

Seigle emphasized that the Filenet systems include not just OSAR but also terminals, an Ethernet-based local-area network, a scanner, proprietary image management software, a laser printer and magnetic tape and disk drives.

Filenet President Ted Smith claimed that the system, announced a year ago, reduces the cost of storing a one-page document from $1.08 on magnetic disk and 20 cents in a manual system to 3.1 cents on optical disk.

Smith also emphasized that a document is available to clerical workers immediately upon being scanned and stored in the 2.5M-page OSAR rather than it spending several days moving from desk to desk.

The applications in which the Filenet system is being used, according to the company, include management of retirement trust account paperwork, birth and death records and money transfer documentation.

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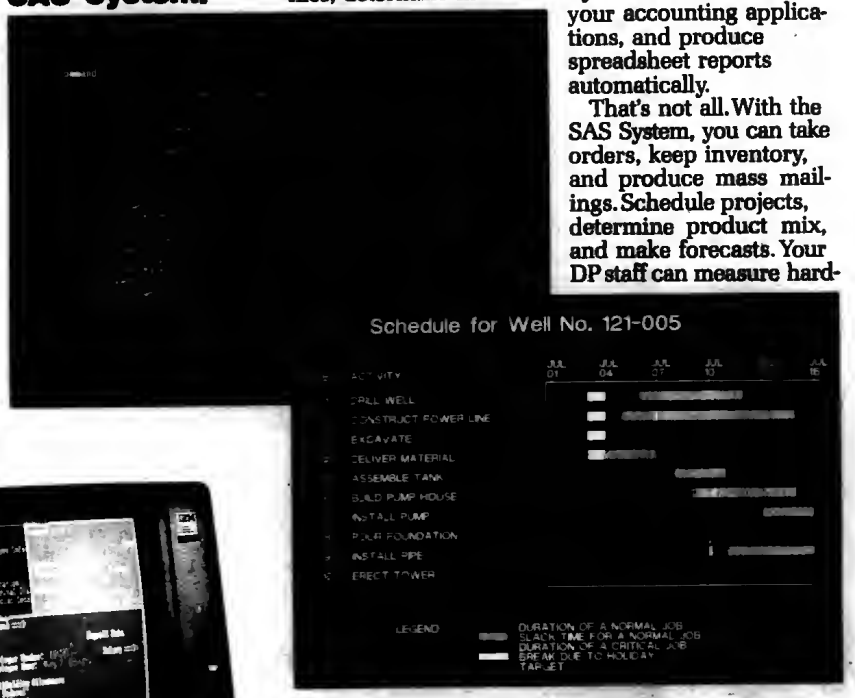

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Wang betters service record

From page 19

few dealings with service personnel for her company's Wang VS 100. "We just haven't had much call for service. It's been running pretty smoothly. When we do need service, they are very good; in fact, they have been bending over backward to help us," said Donna Stodtko, administrative assistant for Resorts International, Inc.

But such praise was not always Wang's. Cullen credits better customer engineer training, establishment of regional remote service centers, restructuring of the service organization and the computer industry slump for the turnaround. That slump, which hit Wang earlier than many other firms, had a sobering effect on the company, Cullen said, and forced Wang to realize it was promoting inexperienced service personnel into management positions.

'Service had a very poor reputation'

"When I came here six years ago, service had a very poor reputation, and, let me tell you, performance equaled the reputation," said Cullen, who moved to Wang after working for Honeywell, Inc. and Data General Corp.

Cullen noted that part of Wang's reputation for poor service was a result of the company's history of selling to end users rather than selling to MIS departments that are more accustomed to system crashes. He said end users complain to their department heads that they cannot work because the system is down and blame the service representative.

Those users, however, do not mention good service. He also said users tend to confuse customer service with delivery, billing and other services, which is a problem that Wang hopes to solve by delivering systems within fixed time periods and by instituting a billing system.

Citing a continuing improvement in Wang's service record, Cullen reported that customer engineer training now emphasizes education in how and why a system works rather than in how to make it run.

In addition, Cullen has brought most software service responsibilities out of the sales department and under customer service. "We discovered that one of the difficulties the customers had was when they decided the problem probably was hardware, they came over here to service, and when they figured it was software they went over there to sales. This led to a lot of finger pointing. Now all of the fix-it-type people are in customer service," Cullen said.

The use of remote diagnostic centers in Lowell, Dallas and Atlanta has eliminated many service calls, Cullen said. In conjunction with that remote service, Wang is offering Uptime 300, which promises customers $100 in rebates for every hour their VS 300 falls below a guaranteed 98% monthly uptime level. In the last quarter of 1985 Wang did not have to pay any rebates, Cullen reported.

Software side improving

He said, "On the software side we are still feeling our way along, but it is getting better."

The director of a start-up independent Wang users group said that for the most part Wang's efforts have been successful. Hank Berkley, owner of Information Exchange Corp. in Stamford, Conn., noted, "A lot of Wang's problems stemmed from having too many new customer engineers because of the growth, and others stemmed from parts problems with too little inventory. Most of those problems have been resolved."

However, he said some fallings remain. For example, Berkley cited the inability of Wang engineers to handle escalation of problems such as tracking down spare parts not stocked at local service centers or calling in specialists. He also said that Wang shows the same regional variations in service quality that all computer companies display.

In addition, Berkley, like Barger, said problems with individuals continue. "They are doing well in training, although I had a guy out here the other day working on my system, and I had to show him how to open the box."

Fujitsu price hike blamed on yen

SAN JOSE, Calif. — Fujitsu America, Inc last week announced price increases of 5% to 8% for its storage, peripheral and telecommunications products, while blaming fluctuations in the Japanese yen for the increases.

The price increases will be effective April 1 for new customers and upon contract renewals or expirations for existing customers in the telecommunications division and storage and peripheral products division, according to a Fujitsu spokesman.

"Actions taken in cooperation between the U.S. and Japanese governments have resulted in a substantial gain in value of the yen relative to the dollar," noted Fujitsu America President Masaka Ogi.

He said peripheral products such as printers will increase by an average of 5% and that storage products, including Winchester disk drives and ½-in. tape drives, will increase by an average of 8%.

According to Ogi, the price increases for telecommunications equipment such as modems, office automation equipment and fiber-optic and satellite transmission systems have not yet been finalized.

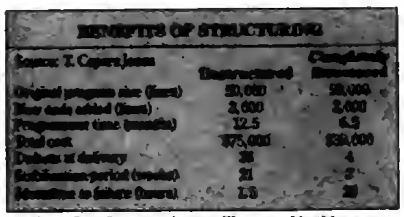
YOU DON'T HAVE A COBOL PROGRAM SO PATCHED AND TANGLED IT CAN'T BE STRUCTURED AUTOMATICALLY.

Until recently, there were only two ways to deal with the patched-up, hand-me-down, unstructured COBOL programs that consume up to 70 percent of your company's software effort.

You could continue to live with the old programs, patching and mending as best you could. Or you could scrap the programs, at enormous cost and disruption, in favor of an entirely new system.

But now there is a third alternative. COBOL structuring. The advantages of this alternative are enormous. Among them, the ability to reduce maintenance costs by 50 percent by more effectively using your programming resources.

The technological leader in COBOL structuring is Language Technology, Inc. In fact, of the very few companies who claim to have a COBOL structuring solution at all, Language Technology is the only one with a system, called RECODER,™ that is fully automatic. The others automate only a portion of the structuring task, leaving the really tough parts to be done manually, over a period of weeks or more, by trained experts, who, because they are human, will make mistakes.



BENEFITS OF STRUCTURING

Source: T. Capers Jones

	Unstructured	Structured
Original program size (lines)	50,000	50,000
New code added (lines)	3,000	3,000
Programmer time (months)	12.5	6.5
Total cost	$75,000	$30,000
Defects at delivery	38	4
Stabilization period (weeks)	21	5
Mean time to failure (hours)	1.5	20

The benefits of structuring are illustrated in this example, representing the costs of adding 3000 lines of new code to an unstructured program of 50,000 lines, as compared to adding the same number of lines to the same size structured program.

Based on proprietary language processing techniques and pioneering research in graph theory, RECODER has reduced the tremendously complex mathematics involved to a provably correct solution so complete that it does not force you to accept its own style of structured code. You can select the level of nesting, type of operators, complexity of expressions, formatting style, representation of procedures, and many other features that might be required by your own in-house standards.

RECODER, available as a service or by license, can automatically structure thousands of lines of COBOL in minutes, without the necessity of adding

Seeking trusty DP scorecards

From page 19

by CW, the system apparently served the purpose well. It told readers that if they accepted the IBM 370/158 Model 3 as having a performance level of 45, they could have a general idea of the performance level of other machines that, for example, might have a higher number if they were more powerful than the 370/158.

CW, working in cooperation with most vendors and some users, later applied relative performance numbers to the non-IBM world. The numbers, while not representing either an endorsement or a criticism of any systems, still gave the reader an idea of what scale system was being discussed without reliance on vague terms like "mainframe," "superminicomputer" or "departmental system."

Numbers less applicable

But the computer business is dynamic, and the result is that the relative performance numbers have become less applicable to the computers being sold in 1986. Where a mainframe such as the 370/158 typically carried a rating of 45, the latest generation of mainframes carry numbers in excess of 2,000, a more than 40-fold growth.

Clearly, the margin for error grows larger with each succeeding generation because some relative performance numbers were assigned to systems largely on the vendors' claims that their products represented an approximate percentage gain on earlier systems.

In addition, while the original relative performance figures measured IBM systems in a largely batch world, it has become more difficult to justify a single formula that measures systems without regard to whether they will be used for payroll and accounting, computer-aided design or automated teller machine support. Few machines are designed for single applications today, and fewer still are configured the same way for two or more applications.

Measurement process needed

What is needed is a measurement process, or several processes, to put at least into perspective a computer's CPU speed and overall system speed. The measurement has to go beyond MIPS in terms of flexibility but cannot be so flexible that vendors overqualify their ratings to the point of uselessness.

With CW's 1986 Hardware Roundup due to be published in August, now is a good time for readers in the user and vendor communities to offer their suggestions on how to measure system performance, whether in mainframes or minis.

The request may seem like a bid for the impossible dream. However, for those who complain that MIPS are inadequate, or that they don't understand relative performance, CW is dropping the gauntlet. What is needed is a workable, even if imperfect process, that can serve the DP manager as well as the vendors and the press. That process has to tell the manager what type of job a system does and how well it does that job.

consultants or any new people to your staff or of requiring any new skills of the people already on it. And, RECODER can do it with a cost effectiveness that will allow it to pay for itself within a year.

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LANGUAGE TECHNOLOGY

THE LEADER IN REDUCING SOFTWARE MAINTENANCE COSTS.

Sequent system has 30 processors

From page 19

many processors can do useful work without creating conflicts on the bus?" If Sequent can prove that its single-bus structure can support 30 processors, then it should be able to support even larger numbers of processors in the future. Users who are undecided about the benefits of parallelism might be reassured by that, Serlin said.

The Balance 21000 can be configured with up to 30 32-bit processors, as compared with the company's previous model, the Balance 8000, which accommodates from two to 12 processors. Up to 256 users, 48M bytes of main memory and 10G bytes of disk storage can be supported on the new system, a spokesman said.

The systems run under Sequent's Dynix operating system. Dynix, an enhanced version of the University of California at Berkeley's Unix 4.2, also supports the System V interface standard and user interface, parallel programming support and Sequent's PDBX parallel debugger.

The 21000 is said to deliver from 2.8 to 21 million instructions per second (MIPS), spanning the performance range from more than twice the Digital Equipment Corp. VAX-11/780 to more than three times that of a stand-alone VAX 8650.

Prices start at $139,000 for a four-processor model, which includes 8M bytes of main memory, 396M bytes of disk storage, 32 asynchronous user lines and a 32-user license for Dynix. Tape backup systems are an additional $6,000 to $24,000, depending upon which size is ordered. Prices range upward to almost $600,000, depending upon configuration.

A $39,000 upgrade from the Balance 8000 to the Balance 21000 is also available. The upgrade involves moving existing processor boards into a higher capacity cabinet with a 26-slot backplane. The Balance 8000 cabinet has a 12-slot backplane. Prices for the 8000 system start at about $60,000.

All software, including the enhanced Fortran package, Verdix Corp.'s Ada Development System and Unify Corp.'s Unify relational data base management system, reportedly run without modification on both Balance systems.

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COMMUNICATIONS

DATA STREAM
John Dix
CW Senior Editor

Independents play Monopoly

If there were some kind of playing board involved — a large, light blue one replete with green homes and red hotels — it would be hard to distinguish the long-distance telecommunications market from a high-stakes game of Monopoly.

The industry is pockmarked by company failures, corporate deals, mergers and acquisitions. The proposed deal to marry GTE Sprint Communications Corp. with U.S. Telecom, Inc. is only the latest, most spectacular development in this frenetic market.

It can be argued that it all began in 1983 when GTE Corp., then the second largest operator of local telephone systems, acquired Sprint from Southern Pacific Communications Co. for $750 million.

But it wasn't until the divestiture of AT&T at the onset of 1984 that the industry began to roll. Consider some of the following developments roughly listed in order of significance:

- IBM sold Satellite Business Systems to MCI Communications Corp. in exchange for a 16% interest in MCI, the nation's second largest long-haul carrier.
- In June 1984, United Telecommunications, Inc. rescued financially ailing U.S. Telephone, Inc., the largest reseller at the time.
- Lexitel Corp. purchased LDX Long Distance from Kansas City Southern Industries in August 1984, taking over its switches and customer base.
- Later, Lexitel merged with Allnet Communication Services, Inc., forming ALC Communications Corp. and securing a position as the nation's fourth largest long-haul carrier.
- Telemarketing Communications, a

See **INDEPENDENTS** page 26

FCC studies 800 Service

Considers providing access to all long-distance carriers

By Bryan Wilkins

WASHINGTON, D.C. — The Federal Communications Commission, taking note of AT&T's monopoly of 800 WATS services, is mulling whether it should take a more active role in stimulating competition.

AT&T's 800 Service — Inward WATS or In WATS — is widely used by companies and corporations that assume the costs of the dialing party. In WATS is often used for telemarketing campaigns, servicing of sales forces and other sales strategies.

The FCC said long-distance carriers are seeking help to obtain local telephone company access for similar services because local-exchange carriers are currently incapable of routing 800 calls to carriers other than AT&T.

The commission noted that an interim 800 access numbering plan for all long-distance carriers has been approved by the U.S. District Court overseeing the AT&T divestiture.

It also said the divested Bell operating companies are jointly developing a coordinated system of data bases for 800 access that will be similar to AT&T's 800 system but that will not be ready until 1987 or 1988.

The former Bell operating companies' 800 numbering plan, according to the FCC, will allow an 800 subscriber to change long-distance carriers without changing its 800 number or to select different carriers to handle 800 calls from different locations at different times of day.

Meanwhile, the divested Bell operating companies have agreed to implement an interim 800 access plan under which the first three digits following 800 identify the long-distance carrier to which calls will be routed, the FCC said.

However, the 800 rulemaking ordered by the commission Jan. 14 seeks public comment on whether a more detailed 800 transition plan should be enacted, including whether the local telephone company must screen calls to ensure they are from locations for which the 800 subscriber has paid and whether the local telephone company can offer 800 subscribers multicarrier choices, least cost routing and number translation.

COMMUNICATIONS NOTES

MCI's Prism I long-distance service bows

MCI Communications Corp. has announced **Prism I**, a competitor to AT&T's **Megacom**. The long-distance service is designed for customers who have a monthly telecommunications bill of $12,000. MCI claimed that the per-minute charge for the new service is priced 30% to 50% lower than AT&T's offering and that Prism I's monthly recurring charge is 20% lower than Megacom's.

■

The **International Telecommunications Satellite Organization** (Intelsat) has added two new categories of domestic services: sale of **Intelsat** transponders for domestic use and long-term leases for domestic services. The organization claimed that the additions will supply a service requirement for some signatories, provide Intelsat with needed revenue, reduce excess space segment capacity and result in lower prices for all classes of service. Intelsat estimated that 190 transponders are available for these new services.

■

AT&T and **Harris Corp.** have agreed to provide a domestic satellite business communications service that would work with one-way broadcast and video data and two-way data communications. Harris would supply AT&T with a variety of satellite equipment. The two companies would work to design and implement Ku-band services for business customers. Once the system is designed, AT&T will be responsible for supplying the service.

See **NOTES** page 26

INSIDE

FCC will limit local zoning rules barring earth stations/**26**

NEW THIS WEEK

- GTE Telenet launches X.25 Dial Service
- For more on this and other new products, see pp. 75-90.

INSTANT ANALYSIS

"Price is still the factor that attracts people to AT&T competitors, but the buying decision depends on transmission quality, reliability and customer support."

— Mary Johnston, director of telecommunications research, the Yankee Group

Pacific Bell's Victoria takes first step toward telecommunications standard

Allows transmission of seven channels

By Peggy Watt

SAN FRANCISCO — Pacific Bell has officially announced Project Victoria, a supermultiplexer technology that could be a forerunner of Integrated Services Digital Network (ISDN), the eagerly awaited telecommunications industry standard that will enable users to send voice, data, video and text over a single digital telephone link.

The project is slated for a six-month trial beginning in March, which, if successful, could lead to commercial deployment in early 1987, according to Thomas C. Edrington, Pacific Bell executive director of technology assessment and planning.

The technology enables a standard twisted-pair telephone line or fiber-optic cable to carry five data channels and two voice channels simultaneously. One data channel at a time can be designated to handle 9.6K bit/sec.; transmission on the other four data channels can range in speed from 50 to 1,200 bit/sec.

The Victoria system is said to be compatible with a wide range of telecommunications equipment and services. The system can also accommodate X.25 transmission by adding a packet assembler/disassembler.

User equipment is connected to an on-site multiplexer through an RS-232C interface, which is linked via a standard telephone line to a transceiver/multiplexer unit at the local Pacific Bell central office. The central office takes care of routing and some of the protocol conversion functions necesssary to connect customers to any long-distance carrier.

Project Victoria currently can handle more than 200,000 subscribers.

At this time, the technology conforms to CCITT 1B+D, the ISDN standard that specifies two 32K bit/sec. voice channels and one 16K bit/sec. data channel.

Pacific Bell claims that it will implement the more popular CCITT 2B+D standard "as soon as commercially viable chips become available." The 2B+D standard defines two 64K bit/sec. voice channels and one 16K bit/sec. data channel.

While initial trials involve small businesses and residential customers, Edrington said the technology could be particularly useful to a large but decentralized corporation for economic data transfer between sites. The faster access speed would also be a boon in communicating with a company's mainframe from a remote terminal.

Victoria's six-month trial period involves some 200 Danville, Calif.-area users of Macintosh computers contributed to the project by Apple Computer, Inc. of Cupertino, Calif. Participants will use the Victoria system to log on to electronic data base services, including a community bulletin board that is being established just for the trial.

Pacific Bell has applied for several patents on various aspects of the technology and expects to license it to other telecommunications companies and former Bell operating companies.

Notes: Harris pact completed

From page 25

AT&T plans to file a tariff with the **Federal Communications Commission** to offer the service in the first half of 1986.

■

Harris also announced the completion of a marketing agreement with **Matsushita Electric Industrial Co.** The agreement enables the Japanese company to sell Harris equipment in the Far East. Also, Harris will integrate Matsushita's **Radio Frequency** terminal into its Ku-band satellite systems.

■

Rolm Corp. has certified **Cohesive Network Corp.**'s **CN-1 System** for use with Rolm's **VSCBX and CBX II** line of private branch exchanges. The Cohesive System includes CN-1 nodes, and network management software supplies a wideband trunk in which voice and data can be dynamically allocated over T1 lines. During the tests, synchronous data was passed through the Rolm **T1/D3**. The test also confirmed the alternate routing and dynamic allocation of bandwidth for Rolm's device.

■

MCI Communications Corp. has called upon the **Federal Communications Commission** to terminate **AT&T's "Reach Out America"** program. The plan is geared to consumers who make more than one hour of long-distance telephone calls per week. MCI claimed that customers overpay for communications services because they are billed at a set rate each month whether or not they require that number of minutes. In addition, MCI claimed that the program is not profitable for AT&T, and, therefore, it violates policies of the FCC.

■

LDX Net, Inc. of Chesterfield, Mo., has completed two more segments of its **regional fiber-optic network.** One link connects **St. Louis** to **Kansas City, Mo.**, and the second segment runs from **Baton Rouge, La.**, to **New Orleans**. Both facilities are interconnected to the company's existing Texas-to-Louisiana network, the company reported. The recently completed portions are part of a 2,000-mile fiber-optic network. LDX is part of the National Telecommunications Network, a consortium of regional carriers.

FCC relaxes rules on earth stations

WASHINGTON, D.C. — The Federal Communications Commission has adopted a policy of preempting local zoning rules that single out earth stations while permitting other antennae to be erected.

The commission said that local zoning regulations must have a "clearly defined health, safety or aesthetic objective" and must not single out receive-only earth station antennae. The same policy applies to earth station transmission antennae.

Under the new rule, local governments may impose nondiscriminatory regulations on earth stations as long as the same regulations are applied to all antennae.

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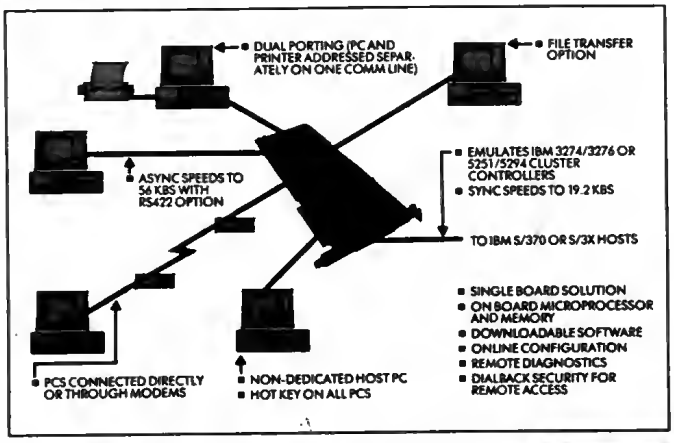

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Independents play Monopoly

From page 25

franchise operator that grew by a factor of 10 in 1984 to become the fourth largest carrier behind Sprint, was splintered into smaller companies when some of the orignal franchisees sued the initial owner.

■ Lightnet was formed as a joint venture owned equally by Southern New England Telephone Co. in Connecticut and CSX Corp., a railroad company in Richmond, Va. A carrier's carrier, Lightnet plans to have a 5,000-mile, Eastern Seaboard fiber-optic network in place by the end of the year.

■ United Telecom cut a deal with Lightnet, agreeing to build part of its network in exchange for net capacity.

■ National Telecommunications Network was formed as a joint venture by seven regional fiber-optic network operators to coordinate administrative, marketing and technical aspects needed to interconnect the respective nets into a national network.

■ Satelco, a $60 million to $70 million Texas-based reseller, filed under Chapter 11 of the Federal Bankruptcy Code in July.

■ Ford Aerospace and Communications Corp. bought Starnet Data Systems Co., a satellite carrier, which it plans to use at least partially for the internal communications needs of its divisions.

■ Advanced Telecommunications, Inc. in Atlanta merged with Americall LDC, Inc., a Jacksonville, Fla.-based reseller, forming a $70 million company.

The industry consolidation isn't over yet. Oddly enough, some of the smaller companies are in less jeopardy than the larger, more ambitious carriers.

But even U.S. Sprint Communications Co., the company GTE and United Telecom want to form by marrying their respective Sprint and U.S. Telecom operating units, has some work to do before it can cruise past "Go" in this Monopoly analogy. U.S. Sprint and the other carriers have to polish their somewhat tarnished images to become carriers worthy of important commercial customers. Corporate America, alas, is still in bed with AT&T.

MICROCOMPUTERS

SMALL TALK
Peggy Watt
West Coast Correspondent

New Apple not far from tree

The "new" Apple Computer, Inc. isn't as emphatic as Lee Iacocca's "new" Chrysler Corp. or Jack Tramiel's "new" Atari Corp. modeled after Iacocca's theme. But this month's Macintosh Plus introduction offered an encouraging blend of old and new Apple personality, especially when compared with the original Macintosh introduction two years ago.

In January 1984, a bow-tied Steve Jobs beamed out of a feature-film-size projection screen, presiding over a pep rally disguised as a shareholders' meeting. He promised that the cute and friendly Mac would ensure 1984 wouldn't be like George Orwell's 1984.

Inside, employees cheered; outside, squeezed-out shareholders fumed. The unveiled Mac introduced itself with "hello" scrawled across its screen.

Earlier this month, dealers and educators — some of those whom Apple needs to please to keep shareholders happy — heard a larger than life projection of President and Chief Executive Officer John Sculley declare, "We are not at the end of an incredible adventure. In fact, we've just barely begun."

Sculley alluded to the ousted Jobs and a redirected company philosophy by acknowledging that "sometimes a crisis reveals the character of a company and the people in it." He promised a more market-conscious Apple.

Less exciting than fighting Big Brother? Maybe — but even the new Apple is not without humor and imagination. Macintosh marketing head Jean-Louis Gassee, who headed French sales two years ago, unveiled the Mac's latest, most powerful incarnation with

See APPLE page 29

Mac Plus musters support

General Computer board, file server program enhance Macintosh for business use

By Peggy Watt

SAN FRANCISCO — A leading manufacturer of internal hard disk drives for Apple Computer, Inc.'s Macintosh has introduced for the Macintosh Plus a high-performance coprocessor board with internal hard disk and a separate file server program for sharing those features.

General Computer Corp. of Cambridge, Mass., joined Apple's new product releases earlier this month by announcing its $3,195 Hyperdrive 2000. The board runs on either the standard 512K-byte Macintosh or Macintosh Plus, replacing the system's CPU with a 12-MHz 68000 microprocessor to double processing speed. The board includes a floating-point 68010 coprocessor for high-speed mathematical calculations, an additional 1.5M bytes of random-access memory and a 20M-byte internal hard disk drive.

Hypernet, the new $295 file server software program, enables as many as 32 Macintoshes to share files, storage and programs when linked through an Appletalk network. It includes a host program to run on a Macintosh with a Hyperdrive internal hard disk drive and displays shared programs available as standard Macintosh desktop icons.

The two products are expected to be available this spring, with Hyperdrive 2000 scheduled to ship in April and Hypernet in May. They will carry an Apple endorsement unique to General Computer products; the endorsement guarantees that installation of the internal peripherals will not void the Apple Computer warranty, which specifies no third-party products may be inserted.

That vote of confidence arrived last June for earlier Hyperdrive models, after

See MAC page 29

Travelers installs, evaluates IBM Token-Ring local-area net

John R. Vacca
Special to CW‡

The IBM Token-Ring local-area network is a high-speed communications network for interconnecting information processing equipment at a local site such as a building or campus. The network uses the IBM Cabling System, including Type 3 specified telephone media and a token-ring access protocol for network traffic control. Products are offered for attaching the IBM Personal Computer to the network.

IBM's new network has worked very well for Hartford, Conn.-based Travelers Corp., according to Joe Brophey, senior vice-president of Travelers data processing department. "The introduction of this new local-area network has proved successful in supporting the installation of 4,000 IBM PCs at Travelers," Brophey remarked.

"It has helped us in the area of sharing computers, printing, files and devices in a building or building complex," according to Brophey. "We have a strategy that says that each of our locations will be serviced by a local-area network so that people can basically communicate in the most convenient way with other computers or with our mainframes — that's the whole purpose of it.

"Probably each local-area network will have a gateway with a high-quality speed printer on it. So there will most likely be sharing of files on the host, with each personal computer having its own files —

See TRAVELERS page 28

Vacca is a free-lance writer and consultant on information management and computer security, based in Topeka, Kan.

NEW THIS WEEK

- Honeywell adds the EP series to its Personal Computer family
- Atari offers its 1040ST personal computer

For more on these and other new products, see pp. 75-90

INSTANT ANALYSIS

"Everything was done by our auditing staff rather than the computer people. They rejected this for a while. We convinced them that this was just an extension of the little adding machines we used to carry."

— Roy Fisher, Fireman's Fund American Life Insurance Co., on outfitting field staff with laptop micros

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ORACLE is currently installed on over 1000 supermini and mainframe systems around the world, as well as on thousands of PCs and compatibles. Oracle's customers include 8 out of the 10 largest U.S. corporations, as well as major foreign companies and many government agencies.

For further information, contact Oracle Corp., Dept. C, 2710 Sand Hill Rd., Menlo Park, CA 94025, or call 415/854-7350.

Travelers uses Token-Ring

From page 27

down-line loaded from the host. Whether you need local storage or not remains questionable. You may or may not; it all depends on the situation.

"The impact of the Token-Ring local-area network for our whole system has been tremendous," Brophey said, but he added that the local net "is only one of four components of our whole networking strategy.

"First of all, we have a nationwide network that consists of a backbone network with high-speed lines connecting our major facilities around the country.

"Second, we have a boundary network, which is a combination of lease lines and a packet network for the hundreds of offices that we have.

"And the third component is within each of the large offices. For example, here in the home office, we've wired all of our facilities for the Token-Ring local-area network so that we can have the most efficient means of communication.

Part of Travelers' strategy

"We also will be able to move large amounts of data around efficiently, thus being able to communicate in the most efficient manner — peer to peer, peer to host, whatever. It's all part of the strategy that we believe will give us the most efficient networking capabilities that will allow us to move data around and to access it — regardless of where that data is located."

The performance of the Token-Ring network at Travelers has turned out to be of the highest quality, Brophey said. "However, we have not had the local-area network installed long enough to give a reasonable report on its performance over a long period of time," he noted.

"As far as volume prices are concerned, they were available from IBM for the Token-Ring network that we installed as well as for the previously announced PC Network," Brophey said. While IBM suggested that a typical eight-station configuration would cost about $828 per workstation, excluding Personal Computers and cabling, Travelers was "able to obtain a volume price of about $750 per workstation," he said.

The new IBM Cabling System option has interfaced remarkably well with the Token-Ring network at Travelers, according to Brophey. This system is otherwise known as the IBM Cabling System Type 3 specified media — an extension of the Cabling System announced in May 1984. The Type 3 is unshielded, twisted-pair telephone wire designed for the physical interconnection of voice and data communications equipment.

Brophey said he expects that the new local-area network will allow Travelers to move terminals easily. "The whole question of logistics of many terminals [comes down to] moving people and so forth." Brophey said he believes that with the Token-Ring, this move can be made easier. "That's an expensive process when you have to pull cable," he added. The token ring will also allow Travelers "to communicate efficiently, move large amounts of data around and access data regardless of where the data is in our network.

"It should open up opportunities for other vendor products," Brophey said. "They'll adapt to that technology, and that's why we're interested in the hardware as much as we're interested in application systems. These systems might be offered by a particular vendor that might serve a particular need for some group of people at Travelers. So we should be able to integrate those types of products into quite a network in the future."

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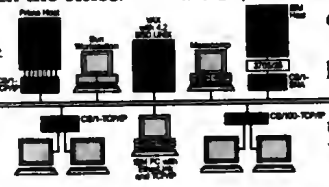

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Mac Plus gets support

From page 27

conscientious wooing of Apple by General Computer representatives and "careful seeding of the Apple sales staff with General Computer hard disks," said Mark Flanagan, General Computer marketing director.

Hyperdrive 2000 is a successor to General Computer's 10M-byte Hyperdrive and 20M-byte Hyperdrive 20 internal hard disks, introduced in the past year. Those products will still be available in new versions designed for the Macintosh Plus. Upgrades are available for $299; purchase prices are $1,695 for the Hyperdrive and $2,195 for Hyperdrive 20.

General Computer is also trying to ensure availability of multiuser software for its Macintosh network through codevelopment agreements with Microsoft Corp., Aldus Corp. and Blyth Software. Blyth publishes Omnis 3 multiuser data base products and said it expects to offer a Hypernet version in May. Delivery dates were not available for versions of Microsoft's leading Macintosh business program, the Excel spreadsheet, or for Aldus' desktop publishing program Page Maker.

"We're cooperating with a number of software vendors to show them how to use the floating-point coprocessor" and take advantage of other Hyperdrive features, said John Ison, product planning director.

Hyperdrive products also feature utility programs that include password protection and encryption options, a print spooler and backup facility, which are also available to Hypernet users.

However, Ison added, any program with a timing loop — common in communications programs — may balk under the Hyperdrive 2000's coprocessor. He said General Computer rewrote part of Appletalk so it will run under the enhancements.

Hypernet also has several fail-safe features built in, including warnings if more than one user is trying to write to the same remote file. Hypernet supports the Corvus Systems, Inc. Omninet protocol for use of multiuser data bases.

Apple not far from tree

From page 27

"bonjour" scrawled across its still-monochrome but high-resolution screen.

The screen showed a music video of sorts, flashing shots of earnest Apple workers, while a singer belted out, "We're building the future with you."

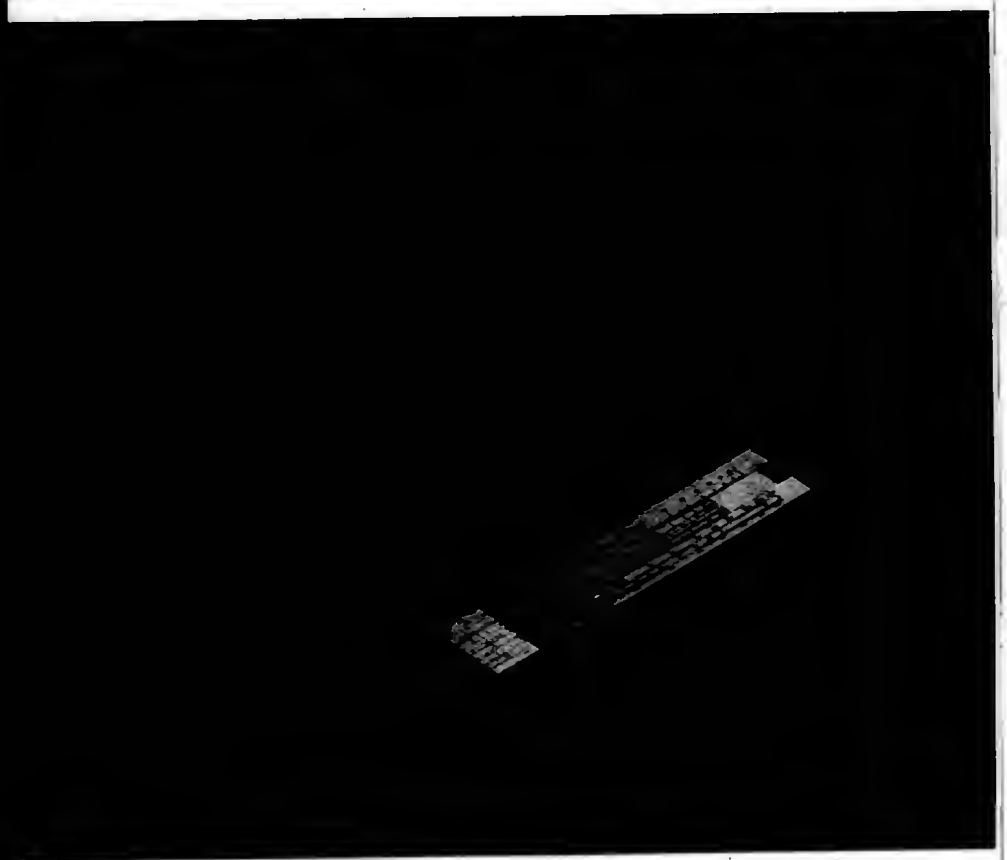
So Steve Jobs' irreverent spirit is still felt, though he is not seen.

But the Macintosh Plus is many things that Jobs did not want: a more open system with a standard port for peripherals, accompanied by a few joint ventures with white-shirt-type companies that the blue-jeaned Apple shunned in the past.

Certainly the firm learned from its mistakes of a year and a half ago, when it angered early Mac enthusiasts who were penalized nearly $1,000 for an upgrade to the new 512K Mac.

This month, Apple announced several upgrade paths for existing Mac owners, without penalizing those who bought early — except for a slight jab at those who boosted their 128K Macs to 512K with the help of enterprising third-party suppliers. Their "unauthorized" upgrades will count as 128K instead of 512K versions when it comes to Plus upgrade kits, Apple decided.

But Apple even made the effort to include upgrade opportunities for the Lisa (Macintosh XL) and offered deals to its faithful school customers. Even an original Laserwriter with upgrade kit costs slightly less than a new Laserwriter. Apple is learning.



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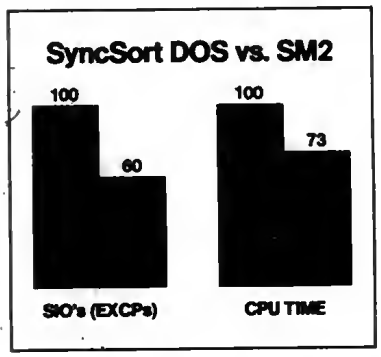

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SOFTWARE & SERVICES

SOFTALK
John Gallant
CW Senior Editor

An upkeep that can't keep up

If there is a DP professional who is unaware of the snowballing software maintenance problem — or who has been in Antarctica for the last five years on a *National Geographic* expedition — the Quality Assurance Institute's (QAI) recently released survey on maintenance should provide some enlightening and sobering reading.

The Orlando, Fla.-based organization's findings (see related story on right) indicate that not only is the maintenance crisis escalating, but, what is worse, management seems to be hiding from it. Though maintenance ravenously eats up an ever larger portion of the DP budget, many managers are attacking the problem by simply shrugging their shoulders and looking the other way.

Let's put the maintenance problem on a plane with "The Family Feud" — ignoring for the moment the risk involved in shedding light on a serious subject by lampooning it. Equate the Quality Assurance Institute with host Richard Dawson. "We surveyed 37 Fortune 500-class companies on what they plan to do in the next 12 months to improve maintenance in their organizations," Dawson explains. Then, turning to the big board, he says, "The QAI survey said . . ." Ding, lights flash, the first answer flips over. "No. 1 answer," Dawson intones, "Do nothing."

That's right. "Do nothing" was ranked the No. 1 response to just that question, according to the organization's findings. Despite the fact that maintenance consumes an average of 51% of the respondents' DP budgets and as much as 90% in some shops, many DP managers will stand by and watch basically unproductive maintenance work swallow up the majority of their resources.

For just that reason, maintenance provides an interesting contrast. For months, DP managers have been

See **UPKEEP** page 34

Survey finds maintenance problem still escalating

By John Gallant

ORLANDO, Fla. — Despite the fact that maintenance consumes as much as 90% of the DP budget in some companies, according to the results of a survey released recently by the Quality Assurance Institute, the maintenance function remains seriously "undermanaged and understaffed."

Headquartered in Orlando, the Quality Assurance Institute surveyed 37 Fortune 500-class companies during the Dallas Software Maintenance Conference, which the organization sponsored in May in conjunction with the Data Processing Management Association. Released this month, the survey findings illustrate the growing severity of the software maintenance problem within large data centers.

Among the highlights of the survey were the following:

- If requests for maintenance ceased, it would take the average company nearly 23 months to fulfill the existing backlog of maintenance requests. The size of the maintenance backlog ranged from a low of two months to a maximum of 60 months.
- Though expenditures on maintenance ranged from 10% to 90% of DP budgets — with an average of 51% — only one-third of the respondents had assigned to one person the responsibility for overseeing the maintenance process.
- Nearly 80% of the respondents said they had systems that had to be maintained by specific individuals because no one else understood the program logic.
- Less than 15% of the companies employed a formal method for determining when programs should be rewritten. Only 16% of the respondents said they require older systems to conform to current programming standards.
- Only 5% of those surveyed said they consider the position of maintenance programmer to be more prestigious than that of new development programmer.

"The survey clearly indicates that management has not yet addressed the maintenance problem," said William Perry, executive director of the Quality Assurance Institute. "Maintenance is still practiced more as an art than as a science. Companies have not developed the methodolo-

See **MAINTENANCE** page 34

SOFTWARE NOTES

Enhanced IBM DB2 in the offing

In a recently released advisory bulletin, **International Data Corp.** (IDC) told clients that **IBM** will unveil within the next six months a new release of **DB2** that will significantly up the performance of the relational data base management system. If IBM can boost DB2's transaction handling capabilities from the current 5 to 12 transactions per second to 10 to 20 transactions per second, **IDC** said, DB2 will begin to compete with IBM's older **IMS**. Thus, the second release of DB2 may mark the beginning of the end of IBM's much-lamented dual DBMS strategy, IDC predicted. In addition to improved performance — which IDC said will be achieved through path selection im-

See **NOTES** page 33

MVS modeling tool released

By Eddy Goldberg

SUNNYVALE, Calif. — CMF/Model 300, an IBM MVS modeling tool that can be used in both daily performance management and long-range capacity planning, is now available from Boole & Babbage, Inc.

The product assesses the impact of system tuning, hardware upgrades and work load growth patterns that affect the performance of an MVS operating environment. By automating the model building and verification processes, CMF/Model 300 enables users to conduct daily performance analyses and develop long-range plans.

A Boole & Babbage spokesman said the product offers three predictive applications. CMF/Study identifies performance bottlenecks that are caused by contention for resources. It also will anticipate where, in a future planning horizon, those bottle-

See **MVS** page 33

INSIDE

Applied Data Research releases a new version of the Look performance measurement system/**32**

Mayda Software Engineering unveils an Ada applications development tool/**34**

NEW THIS WEEK

- Oracle ports relational DBMS to Vaxcluster
- VM Systems Group upgrades V/Spell

For more on these and other new products, see pp. 75-90.

INSTANT ANALYSIS

"Better performance will mean that DB2 should be considered in an evaluation of production DBMS. However, being in the competition and winning it are two different things. DB2 is still an embryonic product, lacking many of the tools and features that non-IBM DBMS offer."

— **International Data Corp. advisory bulletin on DB2**

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SOFTWARE & SERVICES

VAX LISP gets link to DEC tools

ELMSFORD, N.Y. — Composition Systems, Inc. has introduced LISP Toolkit, a product that enables users of Digital Equipment Corp. VAX LISP 1.2 running on DEC VAX superminicomputers under VMS to work with other DEC software packages.

LISP Toolkit links VAX LISP with DEC's FMS package, a forms and menu building package; RDB, a data base; CMS/MMS, a code management package; Decnet, a local-area network; and various applications that conform to the Graphical Kernel System (GKS), a set of graphics standards. The linkage provided by LISP Toolkit provides an integrated development environment. The package can also be used with Inference Corp.'s Automated Reasoning Tool (ART).

LISP Toolkit's GKS module supports the control, use and generation of graphics from VAX LISP or ART. The RDB module provides integration of RDB data bases with application knowledge bases. The Decnet module is said to provide a VAX LISP-based distributed communications environment for cooperative expert systems.

LISP Toolkit supports an unlimited history function that includes display, retrieve and redo capabilities. The software eliminates the need to type parentheses in VAX LISP form. The tool kit's natural language processor includes key words and noise word dictionaries. A spelling checker monitors user input.

The program features a LISP optimization module, a multiwindow environment built on a LISP editor, an interprocess communications capability, and enhanced LISP debugging aids.

Prices for LISP Toolkit range from $6,000 to $24,000.

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ADR boosts monitoring capabilities

PRINCETON, N.J. — Applied Data Research, Inc. (ADR) has announced a version of its Look performance measurement system. The release, Version 6.4, contains a performance monitor for Roscoe, the company's on-line programming system for OS/MVS environments.

The extended monitoring capabilities, called Look/RPM, enable a user to determine activity level, resource use and response time for individual users and the overall Roscoe system as well as to pinpoint potential system bottlenecks.

In addition, the upgraded product allows users to measure the impact of changes for system tuning and tailoring.

Another feature allows multiple Roscoe systems to be monitored simultaneously from any Look-supported device running under TSO, CICS, another Roscoe system or from the master console without interrupting normal Roscoe activities.

Look/RPM monitors Roscoe Versions 5.4 and higher. The permanent license price for Look starts at $30,000 for OS environments and $12,600 for DOS environments.

Notes: CSC inks pact with AT&T

From page 31

provements and better implementation of clustering and other internal data management techniques — the new version of DB2 will probably boast improved system monitoring tools and support for foreign keys and other relational operators such as outer join and outer union.

■

Computer Sciences Corp. (CSC) reported that it will assist **AT&T** in the development of office automation software for AT&T's **Unix System V** as a result of a recentiy inked "multimillion dollar" contract. CSC said it will handle such support functions as market research, software design and development and will supply software already developed by the El Segundo, Calif.-based firm. A spokesman said the office automation software will take advantage of the capabilities of AT&T's 3B processor architecture and digital private branch exchange technology. The software reportedly will support both voice and data services.

■

If you are wondering what the burning topics are in the software industry, the fledgling **Massachusetts Computer Software Council's** recent organizational moves may provide some insights. The council this month formed five subcouncils, which will be headed by founding members of the organization, on "issues of primary concern" to the software industry in the state of Massachusetts. The subcouncils will focus on new technologies, taxes and accounting practices, software distribution and site licensing, export opportunities and employee compensation. Formed in November, the council is made up of chief executive officers of Massachusetts-based independent software companies.

■

Hot on the heels of **Computer Associates International, Inc.'s** acquisition of **CGA Software Products Group's Top Secret IBM MVS** security system [CW, Dec. 16, 1985], **On-Line Software International, Inc.** reported that it acquired the **Secure** system from **Boole & Babbage, Inc.** A spokesman for Fort Lee, N.J.-based On-Line Software said the company will integrate Secure with its existing Omniguard security product. Omniguard currently works in IBM DOS/VSE, VM and CICS environments and will operate under MVS with the addition of Secure capabilities. In April 1985, On-Line Software acquired Boole & Babbage's CICS/Secure product. No purchase price for the Secure acquisition was announced.

■

Users looking for software financing may want to check out **Software Funding International,** a recentiy formed Northfield, Ill., software leasing company. A spokesman for Software Funding said the company was established to "help finance software acquisitions for medium and large companies." He said users can combine mainframe, minicomputer and micro software from any number of companies in a single lease program.

■

Logicware, Inc. and **Revelations Research Ltd.**, two Canadian high-tech companies, have joined to create "the first AI language designed for vector processing by a supercomputer." Logicware, developer of the **MProlog** language, is at work with Revelations Research on the development of a special version of that product designed to run on **Control Data Corp.'s Cyber 205**. Revelations Research was formed to research so-called superchips that simulate the brain's neural network.

■

The Washington Post has selected **Datatek Corp.** of Oklahoma City to install and support a new in-house electronic library system, which will replace the newspaper's clipping archive. The Washington, D.C.-based paper will use the **Basis** text search and retrieval software, developed by Battelle Memorial Institute's Battelle Software Products Center, on its IBM mainframes.

■

Applied Data Research, Inc. (ADR) recentiy donated eight copies of its **ADR/PC Adroit** computer-based training system to the **New York State Education Department.** An ADR spokesman said the systems will be used in a two-year pilot program to create interactive computer-based training courses.

MVS modeling tool released

From page 31

necks will be. MVS/Model is a detailed modeling component that can be used to assess the impact of tuning activities before they are implemented.

MVS/Plan, the third application, can be used for longer term capacity planning and allows a user to define a planning scenario. An analyst using the product can set time horizons from three months to five years and program in a set of variables. With one interactive transaction, the CMF/Model 300 evaluates the performance at each planning point.

All three applications interface to IBM's Graphical Data Display Manager (GDDM) graphics package, allowing users to display results without having to write GDDM code. The work loads supported by CMF/Model 300 are standard MVS work load types, including IBM IMS, CICS, TSO and batch. The CMF/Model 300 is currently available for a base price of $30,000.

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Maintenance problem rising

From page 31

gies, standards and procedures necessary to increase the productivity and quality of maintenance. Maintenance is the area in which DP can achieve its greatest productivity gains during the 1980s."

Perry added that the companies surveyed were not representative of the DP community at large. "Because these companies were attending a conference on maintenance, it should be assumed that they are more sophisticated in performing maintenance."

According to the survey, more than 75% of the companies had a formal procedure for determining the priority of maintenance requests. Almost 70% of the respondents said their firms employed a maintenance methodology and nearly all of those — 86% — said the methodology was part of their new system design methodology.

Asked to rate the maintenance problems facing them, respondents ranked understaffing and lack of control over maintenance as the most serious. When questioned about what steps they planned to take to improve the maintenance process, "do nothing" was the leading response.

Perry said, "Maintenance is just considered an expense, a way of business. DP shops have been conditioned to paying that price, and they do not yet understand that there are alternatives that could dramatically reduce those costs."

Ada processor automates development of programs

NEW YORK — A development processor that helps to automate the development of Ada programs has been released by Mayda Software Engineering of Israel.

"Ada/SDP automatically generates Ada code from natural language input," said a spokesman for Technolinks International, Inc., which distributes the product in North America.

Users can perform consistency checks on system designs and produce design diagnostics. The spokesman said the development processor can reduce the costs of programming and testing.

Redesign costs

Also, since errors can be detected earlier, redesign costs are also said to be lowered.

Ada/SDP is presently available through Technolink. The base price for a version that runs on Digital Equipment Corp.'s VAX/VMS system is $10,000.

It is also available for other systems, including the Data General Corp. MV product line and Perkin-Elmer Corp. 3200 series, the spokesman said.

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An upkeep that can't keep up

From page 31

screaming for help in increasing applications development productivity. Fourth-generation languages, relational data base management systems and personal computer-based workstations for programmers — all of these have hogged the headlines of late as cures for programmer productivity ills.

Maintenance, on the other hand, is unglamorous. Nobody wants to have to deal with it. Only a very small percentage of those surveyed by the institute said they felt the position of maintenance programmer is a more prestigious one than that of new development programmer. New development almost always takes prominence over dreary, old maintenance.

The trouble is, however, that if DP shops don't begin addressing the maintenance problem they won't be doing much new development anymore.

Worst-case scenario

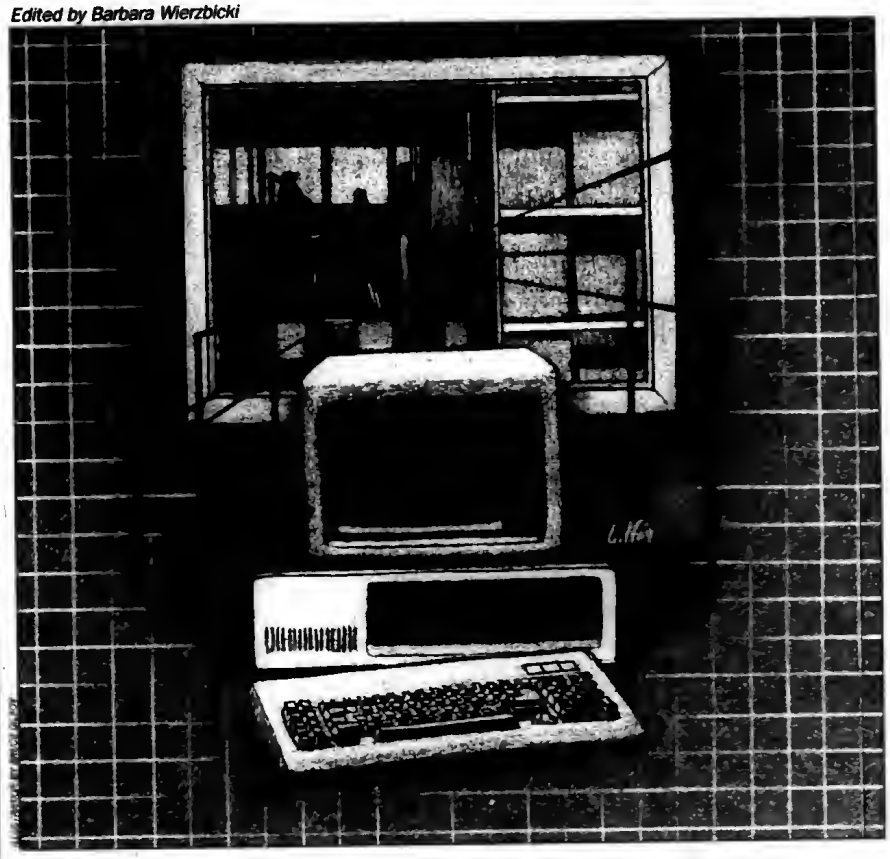
If a DP shop is applying 90% of its resources to maintenance, simple mathematics mandates that it can only apply, at most, the remaining 10% to new development. Admittedly, that's a worst-case scenario. But the budget amount allotted to maintenance is already more than 50% on average and it continues to increase with each passing year.

William Perry, executive director of the Quality Assurance Institute, summed up both the problem and the promise of maintenance, saying, "Maintenance is the area in which DP can achieve its greatest productivity gains during the 1980s." Perry aptly noted that vendors have not targeted enough of their efforts at supplying tools to ease the maintenance crunch. But, he emphasized, the greatest stumbling block is management inattention.

It is clearly time for managers to attack maintenance with the same fervor they have focused on productivity. It's inspiring to talk about new strategic applications and software-inspired competitive edges. But, while all the tools may not be in place, users had better start treating the maintenance cancer before it cripples the body corporate.

Product Spotlight

Edited by Barbara Wierzbicki



INSIDE

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Comprehensive MRP II software chart/49-60

MRP II software

Blueprint for optimizing manufacturing

By CHRIS GRAY

Companies that fail to find ways to make their products faster, better and less expensive — and then even faster, better and less expensive the next day — eventually face extinction. Today, any manufacturing company that is not using or planning to use the computer-integrated manufacturing tools available risks rising costs, eroding markets, declining profits and, finally, market elimination.

In a factory with tens of thousands of active items, several hundred work centers, dozens of vendors, customer reschedules, machine breakdowns, scrap, employee absences, engineering changes and so on, inventory could be kept low in a manual system — but only at the expense of customer service. Manufacturing efficiency could be maximized — but only by increasing inventory.

Manufacturing resource planning (MRP II) is an automated system that makes scheduling and planning all of a manufacturing enterprise's resources practical. As a result, many potential users, as well as data processing managers, are pushing for MRP II installations in order to remain competitive in the manufacturing marketplace.

In some companies, DP may be involved in selling an MRP II implementation approach to top management. In most cases, DP coordinates the MRP II evaluation process and the ultimate selection of a software vendor. Once a package has been chosen, DP must make that software work on the corporate computer and build any required interfaces to existing systems.

Pioneering companies like Twin Disc, Inc., Black & Decker Manufacturing Co., Markem Corp., Steelcase, Inc. and American Sterilizer Co. developed the kernel of an effective scheduling system called material requirements planning (MRP) in the late 1960s and early 1970s. Eventually, this system became known as MRP II.

MRP II, as defined by *The Dictionary of the American Production and Inventory Control Society*, is a method for the effective planning of all the resources of a manufacturing company. Ideally, it addresses operational planning in units and financial planning in dollars and can simulate "what-if" analysis.

MRP II links a variety of functions: business

Seeking the "best" MRP II system is largely unproductive. More important is implementing MRP II in a minimum amount of time.

Gray, coauthor of the "MRP II Standard System" research report, is president of Oliver Wight Software Research, Inc., a market research firm based in Essex Junction, Vt., that conducts evaluations of manufacturing resource planning software packages.

planning, production planning, master production scheduling, MRP and capacity requirements planning, as well as the execution systems for capacity and priority. Outputs from these systems are integrated with financial reports, such as the business plan, purchase commitment report, shipping budget and inventory projections in dollars.

MRP II uses simple, standard logic to simulate what Oliver Wight, a pioneer in this field, called "the universal manufacturing equation": "What are we going to make? What does it take to make it? What do we have? What do we have to get?" MRP II answers the question, "What do we really need, and when do we need it?" by taking a company's high-level plans and breaking them down to detailed schedules for material, capacity, cash and the like.

A functionally complete MRP II package includes the following systems:

The business plan defines the business mission of the company, its markets, profit objectives and resources.

The production plan states, in gross terms, how the business plan will be achieved. It is a statement of planned rates of output by major families of products.

The master production schedule is the specific statement of production for end items or product options within a family.

MRP breaks down the master production schedule into individual procurement, fabrication and subassembly schedules for all component items.

Capacity requirements planning takes the schedules from MRP, extends them by the routing for each item and develops the capacity requirements for each work center, labor resource, tool and so forth.

Financial planning takes the schedules from MRP and the capacity plans from capacity requirements planning to project cash flow and inventory levels and to allocate fixed overhead by work center (used in make/buy decisions).

Shop floor control is one of the execution (control) systems for priority planning.

I/O control is the execution system for capacity planning.

Purchasing is the second of the two execution systems for priority planning.

Performance measurement monitors the overall performance of all areas of the system.

The potential payback from using this system is the single most significant difference between MRP II and other commonly used business systems. Payroll, for example, is a popular accounting application for manufacturing companies installing their first computer. "We'll eliminate two or three payroll clerks," companies say. Yet later, although the system works fine, few firms can point to more than meager savings. Replacing the three payroll clerks with a computer, computer programmer and a keypunch operator or two just does not generate the payback projected by the initial justifications.

In companies getting the full benefits from MRP II, however, the return on investment averages 200%. Even among companies using MRP II only as a better way to order material (far from its real potential), the return on investment is approximately 50%. An average MRP II user reduces inventory by 17%, realizes cost reductions in the range of 7%, improves manufacturing productivity 10% and improves customer service 16%. The return from MRP II in a $60 million company exceeds $100,000 per month.

Many companies ask, "Why does MRP II generate such a high payback, while implementing new accounting applications produces comparatively little?" The reason is fairly simple: Automating tools that work manually never generates a high payback. The payback from MRP is a result of automating a process that cannot really be done manually because of the volume of information. In a company with thousands of items and cumulative lead times up to a year, it is not possible to calculate manually the material requirements for every item and keep them up to date as things change. Yet with the computer, it is not only possible to calculate these plans and schedules and keep them up to date, but it is also practical to perform simulations and review a number of alternate plans.

Yet, while MRP II is different from accounting systems, it does share two similarities. First, like double-entry bookkeeping, there is a standard logic that works. Second, the system's effectiveness depends upon the level of understanding of the people using it, the integrity of the data in the system and the tool — MRP II software — itself, in descending order of importance.

Many companies take a narrow-minded view of manufacturing systems. "We're unique. Our customers are the most demanding, our vendors the most unreliable, our manufacturing process the most complex," they say. "We're big, we're small, we're make to stock, we're make to order, we're a job shop, we're a repetitive manufacturer, we're different. Standard logic doesn't apply to us."

Arguments such as these will not wash with thousands of companies that are already using the standard tools successfully. Whether the factory makes brassieres or jet engines, the challenge of producing a product faster, better and less expensively — and then repeating that process the next day — is the same. Although

Continued on page 38

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IBM reigns in dynamic MRP II marketplace

By ADAM ZAIS

In 1986, the market for manufacturing planning and control systems remains highly dynamic. Participants in this arena number in excess of 300, with more than one-third offering full-fledged manufacturing resource planning (MRP II) systems. By 1990, nearly 51% of U.S. manufacturing plants will install some form of manufacturing information system, representing an estimated investment of more than $16 billion — including hardware, support software and systems and services.

In this rapidly expanding arena, IBM is the major presence. While it will lose some ground as MRP II sales become increasingly software driven and enhancement oriented, IBM will remain the leader in the near future for two reasons: its reputation as a hardware vendor and its marketing strength.

The fact that IBM hardware does not offer the best price/performance ratio does not seem to daunt the major commercial, governmental and educational accounts. Assured of doing business with a company that can meet their maintenance and upgrade needs, major account firms buy IBM computers primarily based on Big Blue's reputation for service and support. This trend holds true for smaller accounts as well, which, with a much narrower margin for error, also choose IBM as the safe supplier.

IBM also effectively markets to and enjoys close relationships with MIS departments in the Fortune 1,000 firms. IBM is a savvy marketing company whose sales representatives are intimate with their accounts' needs and goals.

The market for manufacturing planning and control systems consists of three main competitive arenas. While IBM is leading the pack, no single vendor has won enough share to claim sole possession of second place. Instead, a group of leading vendors account for more than 20% of the market.

Mainframe vendors. IBM and third-party software vendors selling into the Big Blue environment dominate this market segment. The strength of companies such as American Software, Inc., Cullinet Software, Inc., Management Science America Inc., and Cincom Systems, Inc. comes from the experience of providing software for this market on an exclusive basis. These vendors have traditionally been strong in one area, such as data bases or financial applications, and are now offering MRP II packages to their manufacturing customers.

A significant number of users, however, have hitched their wagon to a star in the BUNCH constellation. Generally speaking, these users made the hardware buy decision long before they purchased an MRP II system.

Minicomputer-based systems. This field is largely dominated by Digital Equipment Corp. VAX- and Hewlett-Packard Co. 3000-based software. DEC's presence is a well-kept secret: The company enjoys a solid second place position to IBM when counting CPUs dedicated to MRP II. Key players here are Ask Computer Systems, Inc. and NCA Corp. Ask Computer's success rests squarely on its Manman Manufacturing, a simple and usable system that users can quickly understand and implement. NCA makes Maxcim, the best-selling medium-size system currently running on the VAX. DEC itself has largely standardized its internal manufacturing operations on the NCA system.

Up-and-coming Computer Solutions, Inc., an aggressive young marketing-driven company, is enjoying a very successful year on the HP 3000. Fueled by Growth Power, a flexible and highly integrated system, this company is rapidly gaining a national presence.

On the hardware side, NCR enjoys a well-established user base. It must, however, protect this foundation and use it as a springboard for regaining momentum.

IBM System/34, 36 and 38. This is really a separate marketplace from the minicomputer segment. While there are times when a VAX- or HP-based system runs up against one of these systems in a competitive bid situation, the true competitive flavor here is best described as IBM against IBM third parties. While the System/34, 36 and 38 and the Manufacturing, Accounting and Production Information Control System (MAPICS) and MAPICS II family of software products from IBM have been highly successful, the market for independent software suppliers continues to grow. Whereas IBM has not focused its efforts on the software applications until recently, vendors such as Data 3 Systems, Inc., makers of MRPS 36-S and MRPS 38-S, and Professional Computer Resources, Inc., makers of RMS/38, have quite successfully capitalized on this opening by building quality software products that, in many cases, offer System/34, 36 and 38 users greater usability and integration than those offered by IBM.

The increasing sophistication of manufacturing techniques is resulting in short cycle times, dock-to-line deliveries, certified suppliers, stockless production and so on. Advances in hardware and software and the increasing sophistication of manufacturing management will continue to drive a growing and competitive marketplace. ■

Zais is director of the Computer-Integrated Manufacturing Service at International Data Corp., a worldwide market research and consulting firm based in Framingham, Mass.

MAJOR MRP II SOFTWARE VENDORS

Vendor	Package	1984 MRP II Software Sales ($ in millions)	Current User Sites (worldwide)
American Software, Inc.	MRP-II	20.5	300
Arthur Anderson & Co.	Mac-Pac Mac-Pac/38	Not available	305
Ask Computer Systems, Inc.	Manman Manufacturing	34	950 (including Admin)
Cincom Systems, Inc.	Control: Manufacturing	8.5	200
Computer Solutions, Inc.	Growth Power	5	150
Cullinet Corp.	AMAPS Q/G/3000	24.9 (including services)	550
Cullinet Software, Inc.	CMS	20.3*	250
Data 3 Systems, Inc.	MRPS 36-S MRPS 38-S	6.2	250
Hewlett-Packard Co.	MM/PM 3000	13	1,300
Honeywell, Inc.	HMS	6	200
IBM	MAPICS COPICS	102	10,000 500
Management Science America, Inc.	MSA Manufacturing System	9.3	183
NCA Corp.	Maxcim	19	500
NCR Corp.	MCS II	Not available	1,200
Professional Computer Resources, Inc.	RMS/38	Not available	200
Xerox Computer Services	Xerox Business Management System	100	500+

* Figures for period of May 1, 1984 to April 30, 1985

Source: International Data Corp.

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Continued from page 36

differences in technique exist among the effective users of MRP II, the message is clear: There is a basic set of tools for planning the resources of a manufacturing enterprise. This is no different from the basic set of tools — double-entry bookkeeping — used in accounting.

Sometime during the evolution of systems, the role of people was misplaced. Even today, many companies getting into MRP II for the first time think that it means "miracle requirements planning." "What's the best software package?" they ask. "Just between you and me, isn't so-and-so's package the best software package available? After all, isn't it essential that we find the very best software before we do anything else with implementing the system?"

> ***Rather than deferring the benefits of MRP II by a protracted software search, it is generally better to make a reasonable software decision quickly and get the system on-line.***

These people have lost sight of the objective. The objective is not to own the "best" software or to implement the most state-of-the-art system. The objective is to make your product better, less expensive, faster — and to put in place the management tools required to help accomplish this goal. Most of the commercially available software packages can be used to do this. Some packages require more modifications than others. Some packages are functionally incomplete, while others are complete but frustratingly complicated. Some are easy to interface with existing systems. Others are not. Still others are extremely inefficient from the point of view of data processing.

Despite such shortcomings, most of these packages are being used successfully. Any MRP II system — in the hands of people who know how to use it — generates outstanding results. People are the key to effective systems.

Even if the objective were to find a state-of-the-art system, in many market segments, software packages cannot be easily distinguished on the basis of functionality. For example, most companies buying software for IBM mainframe computers seem to take forever to select a system. Yet most of the popular packages in the IBM mainframe market feature very similar levels of real functionality. This situation is caused partly by the relative maturity of this market segment and partly by the force of competition. The only real differentiation in certain segments lies in technology (as opposed to functionality), human engineering, simplicity of the software and the degree of integration with other vendor-supplied systems.

Consequently, while it is worth some effort evaluating and selecting software, looking for the "best" MRP II software is largely an unproductive exercise. More important is keeping the objective — successfully implementing MRP II in a minimum amount of time — in sight. There are a number of ways to reach the objective, and software is just part of the job.

When companies ask about the "best software package," the answer should be, "Nearly all of the different packages can be made to work, but some require more modification and frustration than others." Rather than deferring the benefits of MRP II by a protracted software search, it is generally better to make a reasonable software decision quickly and get the system on-line.

The number of software packages available today is staggering. Back in the early days of MRP, there were few real software choices. A company could use IBM's Production Information and Control System, write a system from scratch or not do MRP at all. By 1974, there were 40 packages capable of performing MRP. Since then, the number of vendors, distributors and packages available has grown at the rate of almost 20% per year.

Today, unless a company owns a truly obscure computer, there undoubtedly exists a workable software choice. One of the main problems for most companies may be that the number of choices is overwhelming — especially if the company is unconstrained by existing hardware.

A second major problem with MRP II software, according to industry expert Dave Garwood, is that "companies' expectations of the software packages significantly exceed the packages' capabilities."

Part of the problem with MRP II software packages is caused by the term "package." Package implies that the software can be plugged in and run. Most people still assume that installing a software package is like installing an appliance: Take delivery, uncrate it, plug it in, connect it, turn it on and watch it run.

This, unfortunately, is not the case. Companies evaluating MRP II software packages should expect to find some functional deficiencies. For example, many packages will be missing a complete function for master production scheduling products

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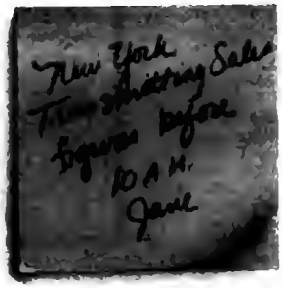

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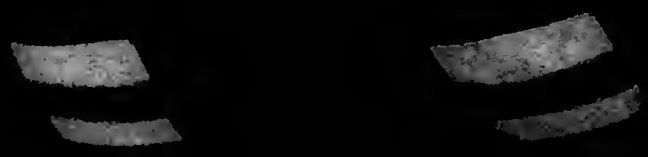

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with options. Most packages will be missing the vendor negotiation and vendor scheduling functions needed in a modern purchasing system.

Many systems will lack the functions for lot control required by the Food and Drug Administration, and most will not support the contract reporting requirements of the Department of Defense.

Experience shows that changes may need to be made to one or all of the following areas:

Inventory transaction system. Most packages are functionally complete, although sometimes programming is required to provide two-step cycle counting support.

Bill of materials system. The majority of systems are reasonably complete but sometimes they lack support for planning and controlling engineering changes.

Scheduled receipts system. Sometimes effort is required to provide a component availability check and, in a distribution system, to track distribution orders in transit from supplying plant to distribution center. Often, logic for final assembly scheduling of an assembled-to-order product has to be added.

Logic of MRP. Many packages are complete, although a typical problem is in the physical display and arrangement of information. Often, the system designers expect a planner to work with three or more reports to see all the information required to solve a problem. This situation is impractical and normally requires programming effort to consolidate information onto one, or at the most two, reports.

Master production scheduling. Some software packages lack the required functionality for master production scheduling. Typically, software packages lack the proper logic for master scheduling products with options.

Purchasing. Most MRP II software packages feature few purchasing functions for vendor scheduling, vendor negotiation or vendor performance evaluation. Companies implementing the software normally program these capabilities.

I/O control. Most purchased software includes little in the way of I/O control.

Financial planning. Most software packages have few financial planning capabilities.

Another area not well understood is interfacing to existing systems. For many larger companies, the effort required to interface a software package to existing accounting, order entry, labor reporting, automated storage and retrieval systems may exceed the effort required to develop missing functions.

Any software evaluation should identify both of the following:

- Functions that are missing or that work incorrectly and an estimate of the effort required to provide or fix them. This information allows data processing enough time to plan for making the changes within the implementation time schedule.
- Whether or not it is possible to interface with the package being reviewed, how much time is required, whether or not it will delay the cut over to MRP and how much it will cost.

There are a number of ways in which MRP II software can be modified or interfaced to other systems. The most efficient method is to change the vendor-supplied source programs. Unfortunately, however, the modified program is probably now incompatible with future releases of the system. When companies choose to modify the vendor-supplied programs, they tacitly agree to maintain these programs through future releases.

Another approach is to pass information back and forth using work files and user-written programs. While this method is typically less efficient than modifying the vendor's program, it is easier to maintain, especially through future releases of the system.

After looking at the different software packages and the effort required to interface to existing systems, some companies may be tempted to write an MRP II system from scratch. Developing a complete MRP II system is not an acceptable

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alternative for a company taking the standard, aggressive approach to implementing MRP II.

The track record for homegrown MRP II software is not good. Although a few of the pioneers in MRP II did write their own software, it is hard to point to more than a handful of companies that have successfully developed systems from scratch. Even in the case of those that did, the development typically occurred over an extended number of years. For these reasons, few companies even consider developing their own MRP II software.

□ □

Areas to cover in MRP II software evaluation

An effective evaluation of MRP II software packages should include specific examinations of the following areas:

Functionality. The functions of the software should be compared with the proven set of tools that make up MRP II. MRP pioneer Wight once said: "If it doesn't matter whether or not the system works or not, its designers are entitled to unlimited creativity. If, however, the objective is to have a system that actually works, it will have to simulate the universal manufacturing equation. And its fundamental logic will be the same as all the other systems that work."

As explained earlier, a set of functions has emerged over the years as a result of operating MRP II systems successfully. These functions are not theory. They define the kernel of logic necessary to implement a complete MRP II system. They are the functions that should be used in evaluating any MRP II software.

Many times, companies getting into MRP II develop elaborate checklists of features and detailed scoring systems to determine statistically the "best package." Flipping a coin might work better. A drawn out requirements definition phase typically delays the implementation and causes a great deal of time, money and effort to be expended on features, functions and options that are largely unnecessary.

In addition, the point scoring method often demonstrates that the "best" software is the package with the greatest number of unnecessary features — and the prospective buyer still does not get a system with all the things that he wanted. Any company evaluating MRP II software packages would be well advised to do the following:

- Understand the basic kernel of logic that is absolutely essential in an MRP II system.
- Evaluate software against the essential functions of MRP II.
- Plan on adding any special functions rather than looking for a single piece of software that satisfies both the basic functional requirements of MRP II and the additional set of special features.

Some vendors say that the additional features, functions and options (those beyond the basic set of MRP II functions) are really an advantage. "After all," they say, "It's just like equipping an airplane cockpit with more instruments and controls. If you don't want to use the feature, you just don't use it. How can you argue that having more controls isn't better for the pilot?"

This is a bad analogy. A better analogy would be that adding features, functions and options to an MRP II system is like adding controls to each passenger's seat in the airplane.

Now, instead of simply explaining how the seat belts work and pointing out the exits, the flight attendants would need to add the following: "I'd like to point out the three red buttons, the two yellow buttons and the green joystick located on your armrest. Please do not press any of the red buttons during takeoff, and do not use the joystick during landing. If you do . . ."

The point is that additional functions imply additional educational burdens in implementing and operating the system. In the case of some popular software, the educational burden placed on companies implementing the system is double what it should be.

In fairness to the vendors, it should be said that they are on the horns of a dilemma. Particularly in the IBM mainframe marketplace, the simple stripped-down software

KEY MRP II EVALUATION POINTS

- A comparison of the manufacturer's description of the system's functionality with the functions proven in practice.
- An analysis of the effort required to modify the system.
- An analysis of the effort required to interface the system with other existing systems.
- An assessment of the design philosophies that went into the software.
- A comparison of the true costs of the different software packages.
- The identification of negotiable and nonnegotiable selected requirements.
- An estimate of the processing and response times required.
- An assessment of other interfacing applications offered by the vendor.
- An analysis of the vendor's financial strength.
- An analysis of the quality and quantity of support proposed.
- An assessment of the quality of the documentation.

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packages do not seem to sell well. Consequently, a company has one of two choices: Write a simple, straightforward, stripped-down system that does not sell, or write a package that will compete well on features but is more difficult than necessary to implement.

And the problem lies not only with software suppliers that build excessive layers of complexity into their systems. Oliver Wight Software Research, Inc. Chairman Darryl Landvater recently wrote in the company's internal newsletter:

"Users' experience with their own systems and data processing group many times adds to software complexity. In many instances, the DP group is seen as inflexible and unresponsive. Therefore, users look for software packages loaded with unique features and functions. If they had confidence in their DP group, they would be content with a simple and standardized MRP II software product and would have their DP group make any minor changes to fit their particular situation.

"It all comes down to expectations. Does the software buyer understand what to expect in an MRP II software product — what the software should provide, what is not necessary and, therefore, constitutes an expensive complication? Do the users have reasonable expectations about their own data processing group? Can they modify purchased software to provide for some of their company's particular needs? Do the users and the data processing people both have reasonable expectations about software in general?

"It's typically more complex than it needs to be; it never provides all the functions that a particular company feels it needs and usually has a number of minor technical glitches. A wise manager does some work up front to control expectations. Simple as it sounds, controlling expectations is one of the most important elements in managing the software part of an MRP II project."

Cost analysis. Several years ago, a vendor offering a functionally complete MRP II software package could, and did, command any price. Several MRP II software packages cost upward of $500,000 each.

At that time, the cost of the software was more directly related to the functional completeness of the software: A package with a limited set of functions sold at a lower cost, and a package with a more complete set of functions carried a higher price tag.

Today, however, a number of fairly complete packages are emerging at prices less than $175,000. Consequently, many companies are legitimately questioning whether the software in the $500,000 and up range is worth the money. The answer lies in the true costs of the packages.

The first step in determining the true cost of a software package is to complete the cost-justification for implementing the system. This is the cost-justification that top management approves prior to starting the implementation. The key number in this justification (for the purposes of costing software) is the yearly or monthly recurring benefit once MRP II is fully implemented. The recurring benefit from MRP II is also the cost of delay. For example, if the monthly return from MRP II is $200,000, then the cost of delaying the project a single month is $200,000.

> ***Many companies are legitimately questioning whether the software in the $500,000 and up range is worth the money.***

The second step is to estimate the effort — both time and money — required to add any missing functions to the software package. Only the functional deficiencies identified in the comparison with the standard logic of MRP II should be included in this estimate. The point is to estimate what it would take to bring each package up to the standard, not what it would take to put all the bells and whistles of the more expensive package in the less expensive package.

Only the out-of-pocket expenses should be included in this estimate. The cost of in-house systems and programming people already in the company should not be included.

Add the out-of-pocket expense for modifications to the list price of each software package. In addition, if the amount of time required for the modifications causes a delay in the implementation schedule, multiply the monthly cost of delay taken from the cost/benefit statement by the number of months that the project would be delayed and add this amount to the cost of the software package.

These are the true costs of the software packages. If the less expensive package is still less expensive, then it is probably a very good deal. If not, then the more expensive package is worth the money.

Technical requirements. The technical requirements for software can be divided into two categories:

- Nonnegotiable. Companies using an IBM 4341 computer with MVS, IMS and CICS, for example, have only six to eight choices since the software must operate on a specific type of computer, operating system

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AT&T offers a number of ways to share information. Computers, peripherals and even PBX switches can be linked at both local and departmental levels through systems like AT&T 3BNET and the AT&T STARLAN NETWORK.

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For a copy of excerpts from the Software News survey or for information about Cullinet Seminars in your area, phone 1-800-551-4555.

Software Category: Inventory control

Percent of Installed User Base 1982	Percent of Installed User Base 1983	Percent of Installed User Base 1984	Percent of Sites Considering Vendor For 1985
		38.4	Cullinet 18.7

Software Category: Purchasing management

Percent of Installed User Base 1982	Percent of Installed User Base 1983	Percent of Installed User Base 1984	Percent of Sites Considering Vendor For 1985
			Cullinet 18.0

Software Category: Bill of material processing

Percent of Installed User Base 1982	Percent of Installed User Base 1983	Percent of Installed User Base 1984	Percent of Sites Considering Vendor For 1985
IBM		43.6	Cullinet 24.6
Arthur Anders			
Hewlett-Packa			
Comserv			
Honeywell			
Cincom			
GMD Syster			
Martin Mar			
NCA			

Software Category: Manufacturing resource planning

Percent of Installed User Base 1982	Percent of Installed User Base 1983	Percent of Installed User Base 1984	Percent of Sites Considering Vendor For 1985
IBM 42.7	IBM 34.5	IBM 34.5	Cullinet 16.7
Comserv 9.8	Comserv 8.1	Sperry Univac 8.6	
Honeywell 6.1	Martin Marietta 6.9	Comserv	
MSA 4.9	Burroughs		

Software Category: Master production Scheduling

Percent of Installed User Base 1982	Percent of Installed User Base 1983	Percent of Installed User Base 1984	Percent of Sites Considering Vendor For 1985
Not included in 1982	IBM 36.7	IBM 34.0	Cullinet 19.3
	Comserv 12.3	Comserv 11.4	Services
	Honeywell 6.1	MSA 6.4	Comserv 11.7
	Martin Marietta 6.1	NCR 6.4	IBM 9.5
	Burroughs 4.1	Software International 4.3	Arthur Anderson 9.5
	MSA 4.1	Sperry Univac 4.3	ASK 4.7
	Thomas, Laguban & Associates 4.1	Thomas, Laguban & Associates 4.3	Cincom 4.7
	Xerox Computer Services 4.1	ASK 2.1	Honeywell 2.2
	All others (11 firms) 22.4	Cullinet 2.1	All others** (4 firms) 6.7
		Martin Marietta 2.1	
		All others* (14 firms) 22.6	

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and data base management system.

■ Negotiable. For example, the technical characteristics of the software may be more negotiable for companies implementing MRP II that are getting into computers for the first time, switching from a corporate computer to a local computer, or converting from one type of computer to another.

Computer runtimes and response times. Because most software packages are now on-line systems, the performance or processing time required by the system is more critical than if the system were a batch processing system. In a batch system, if the processing estimates are significantly in error, the problem is probably not overwhelming. The system still works; the computer runs later at night or all weekend.

In an on-line system, if the performance estimates are significantly in error, the situation is different. The productivity of quite a few people will be affected as they wait for the system to respond. For this reason, make sure a contract contains assurances that all transaction volumes and processing requirements can be accommodated.

One way to do this is to use a simulator to estimate the processing requirements. Another method is to review some test cases using different transaction volumes and types of transactions. The software vendor should be willing to develop a performance estimate using one of these methods and include this estimate in the contract.

Other business systems. Some vendors offer interfacing applications that are part of a larger systems architecture. A company may want to use these other applications now or in the future. Another vendor, with no other packages, may create an interface problem between systems or force a company to write the other applications software itself.

Support. The evaluation of MRP II software should also include an analysis of the following:

■ The vendor's representatives responsible for helping a company implement the system.

■ The technical support services from the vendor.

■ The training programs available on the system.

■ The amount of support proposed.

A company evaluating MRP II software would be wise to question the amount of support proposed by a software vendor. Proposals for turnkey implementations or extraordinary levels of support could be evidence of a vendor's misunderstanding of a company's needs.

> ***The ultimate users of the system must "spill their own blood on the system" during the implementation; otherwise, they will have little incentive for making it work.***

Experience shows that implementing MRP II successfully requires ownership on the part of the people implementing the software. The ultimate users of the system must "spill their own blood on the system" during the implementation; otherwise, they will have little incentive for making it work.

While support from a vendor is essential, this support should not be confused with the necessity of users taking part in the implementation of their own systems.

Software vendors should expect to justify the amount of consulting and training support proposed. While most people would expect a functionally complete, more expensive software package to offer less support than a less expensive package, experience suggests the opposite. In fact, an Oliver Wight Software Research survey done in mid-1981 showed that the support quoted by many software vendors was

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1. What is Just-In-Time?
Just-In-Time is a philosophy that has at its heart the elimination of all non-value adding operations, equipment, and resources. Since its introduction in the U.S., JIT has helped manufacturers reduce costs, increase productivity, and challenge foreign competitors once again.

2. How does JIT work?
JIT simplifies the manufacturing process by eliminating waste throughout the system. This includes inventory at both ends, and all material, machines and manpower that do not contribute directly to the product. Activities such as moving, storing, counting, sorting, scheduling, and quality inspection, which add cost but not value, are prime targets.

3. How does Xerox software support the JIT environment?
The essence of JIT is its ability to deal with problems as they arise, and make "instant" adjustments to maintain minimum inventories, maximum quality control and uniform plant load. This requires an Information Control System that provides continuous, integrated feedback on actual conditions from factory floor to business office.

4. Has Xerox software paid off in practice?
To cite one recent case history, a Xerox copier plant using our software to support JIT reduced its unit manufacturing costs by 50% while achieving the highest quality in the market. This resulted in a 400% increase in sales against stiff competition from Japanese manufacturers.

5. What about specific production economies?
Coopers & Lybrand partner William A. Wheeler III, a leading authority who consults with Xerox on JIT training and education, says most companies can realize a 20% to 40% reduction in costs of goods sold. He reports inventories cut by two-thirds, machine set-up and changeover times reduced by 90%, throughput times shortened from weeks to hours, productivity improved by 40%.

6. Do other experts support your claims?
Edward J. Hay, Senior Vice President of *Rath & Strong*, a leading JIT consulting firm employed by Xerox, reports that companies using JIT over a period of time have experienced the following results:

- 90% reductions in lead times
- 50% increases in direct labor productivity
- 60% increases in indirect labor productivity
- 50% reductions in scrap, rework, warranty costs
- 80% reductions in inventory
- 75% reductions in set-ups

7. Will JIT work in our manufacturing environment?
JIT is applicable to *any* environment: repetitive, discrete, job shop, engineer-to-order, or combinations of the above.

8. How do we implement it?
Make the commitment to rethink your basic manufacturing philosophy. Analyze your current situation, identify your problems, and target your opportunities. Gather the facts needed to plan a phased and orderly transition. Select a software vendor with a program that supports the JIT environment and an organization that can follow through on service, education and fine tuning.

9. How long will it take?
Some companies see significant improvements within six months. But the JIT process of continually monitoring your operations to identify and eliminate waste, goes on forever.

10. How can I educate my President about JIT?
Mail the coupon to JIT Division, Xerox Computer Services, P.O. Box 66924, Los Angeles, CA 90066. Or call our Toll Free number, **1-800-223-3799**, for our *JIT Manufacturing Survival Kit* including information-in-depth on all the above aspects of JIT; plus what to do with your MRP system, how JIT affects your customers and vendors, and the relationship between JIT and CIM.

directly proportional to the cost of the software. When the software cost $50,000, the proposed support was typically less than $20,000. When the software cost $350,000, the proposed support was approximately $150,000.

Vendor documentation. Evaluation of MRP II software normally includes an assessment of the documentation. Organization and indexing may be the most important elements of effective documentation. Piecing together an explanation from several different sources without effective indexing is frustrating and a poor use of time.

Vendor's financial strength. Any company examining an MRP II package should also assess the vendor's financial strength and whether or not the supplier is likely to remain in the business of developing and marketing manufacturing software.

There are a number of features that are part of a good software package but that are not specific functions. These are design philosophies embodied in the software. A designer who does not understand these philosophies will produce a package with limitations or fundamental flaws.

The most important of these philosophies, according to the 1983 "MRP II Standard System" research report, are the following

Simulation of reality. An MRP II system has only one purpose: to simulate accurately the realities of a manufacturing environment. A software package that does not accurately simulate reality thwarts the primary objective of the system.

Simplicity. A software package needs a full set of functions. Any additional features in the system are both unnecessary and undesirable. They generally make the operation of the system overly complicated, and in doing so, destroy its native and inherent simplicity.

Standardization. Standardization is general applicability. A system that adheres to standards and conventions will have fewer problems in implementation and operation. Standardization lays the groundwork for effective communications and problem solving.

Ingenuity. People have the ingenuity to solve day-to-day operational problems if they are given a statement of the problem and a clear-cut directive to solve it. A good system will point out the problem without attempting to devise a solution. By the time that all the logic and parameters are designed into a system for solving the endless numbers of situations and occurrences, the system becomes too complicated and cumbersome.

MRP II provides people with a basic set of tools that allows them to improve productivity in every aspect of a manufacturing business. Almost any MRP II software package can be made to work — provided the system is in the hands of knowledgeable users. The ultimate success of any MRP II system relies most heavily upon the understanding of the people using it. ■

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Strategy for survival after the installation

By DICK BOURKE and PHIL BUSBY

The project team has completed its evaluation and selection process. The steering committee has approved the team's recommendations. MIS has received the manufacturing resource planning (MRP II) software and all that goes with it. Now what?

After installing the software on a company's computer system, the vendor typically checks the programs with its own test data base. While such a procedure is perfectly acceptable during the preliminary stages, be sure to document all problems and resolve them before actually accepting the software and making a final payment. Also, be aware that testing with a vendor's test data base does not dismiss the need to develop your own test data.

> ***"Not maintaining the software at the current release level creates an unnecessarily high risk."***

At this point, vendors usually recommend using the software in a plain vanilla form before attempting modifications. However, no software package is a perfect fit: Your MRP II system will require modifications.

To that end, establish a clear-cut modification policy, since this issue can become an emotional topic during tough times of implementation. The policy, while recognizing the necessity of changes, should also require that all proposed modifications be justified by cost and benefit and categorized as major or minor alterations. If a proposed change is deemed critical, then the modification should be available by the time the project team conducts the conference room pilot.

A conference room pilot allows the project team — consisting of users and MIS personnel — to exercise fully the entire system, including the programs, policies and procedures, before proceeding to a live implementation. To be effective, the conference room pilot needs to be as realistic as possible. Therefore, in addition to the vendor's test data base, the project team should also use a representative sample of company data when conducting the pilot activity.

Thoroughly evaluate the user documentation before the conference room pilot takes place. Documentation ranges from excellent to downright shabby. Examine all manuals for their use as day-to-day reference aids. A good time to determine the accuracy and usefulness of the documentation, for example, is during the setup of a training data base. In particular, look at the glossary or data dictionary. Most users need to look up key terms, definitions and allowable values daily. Such careful scrutiny helps to determine the level of effort that will be required to rewrite the documentation to fit specific procedures.

An MRP II implementation, although difficult and tedious, is a finite procedure. Software maintenance, on the other hand, is a never-ending process guaranteed to test the mettle of a company's technical staff.

First of all, assume there will always be bugs. All procedures, therefore, should include the mechanics to isolate, define and document the operating conditions that exist when a problem occurs. Notify the vendor in writing of these problems and conditions. Most vendors try to be responsive to such problem requests. Give them a reasonable opportunity to correct bugs quickly by providing them with specific documentation.

Apply any maintenance fixes with a high degree of care — fixes have a way of unfixing something else. If you can possibly avoid it, do not rush in to apply maintenance. Check with the users group in your area and share experiences.

Whether to maintain the software at the current release level causes much debate. Despite arguments that doing so impedes the implementation effort, not maintaining the software at the current release level creates an unnecessarily high risk.

Problems with maintaining and modifying mainframe software have been one of the causes of the "personal computer syndrome" — that is, stand-alone use by individuals. But since manufacturing systems require an integrated data base as their foundation, the current interest in stand-alone personal computers is illusory. Sooner or later the data needs to be integrated. Personal computers can be used in a network, however, assuming their use is carefully planned. By doing a good and timely job on the mainframe software implementation the perceived need never arises.

The ingredients for successfully implementing an MRP II system are well recognized as being management commitment, trained personnel, disciplined use of procedures, a solid foundation of accurate data and a respectable software package. Although software issues may not be as critical as management commitment and comprehensive education programs, if treated too lightly, they can cripple — or kill — an MRP II implementation. ■

Bourke and Busby are partners in the educational development and implementation consulting firms of Bourke-Arnold Enterprises and QUS, Inc. of Pasadena, Calif.

MRP II SOFTWARE*

MARS/2000 ACM Software, Inc. Suite 324 3001 W. Big Beaver Road Troy, Mich. 48084	98% real time	Labor reporting only	No	Yes	No	Yes	No	IBM System/34, 36	Product data base, standard product costing, shop floor inventory control, purchasing, master production	scheduling/MRP, capacity requirements planning, job inventory costing, physical inventory control
Manage-2000 Automatic Data Processing, Inc. 1 ADP Blvd. Roseland, N.J. 07068	Yes	No	Yes	Yes	Yes	Yes	Yes	Prime Computer, Inc., NCR Corp./ ADDS, Honeywell, Inc./ Ultimate Corp., Digital Equipment Corp./ Ultimate, McDonnell Douglas Automation Co./ Microdata Corp.	System control module, bill of materials, inventory transaction/ stock status, purchasing, MRP, work centers/routings, shop floor control/ labor reporting, capacity requirements planning, work order costing, group technical/ design retrieval	
Celns, Spire, Mile[2] Advanced Data Systems, Inc. Suite 105 3604 Galley Road Colorado Springs, Colo. 80909	Yes	No	Yes	Not applicable	No	Yes	Not applicable	Hewlett-Packard Co. 3000, AT&T Unix-based systems	Accounting modules, customer order processing, sales analysis, product engineering, job definition, material control,	purchasing, capacity analysis/ scheduling, shop floor labor data collection, equipment maintenance
MRP-II American Software, Inc. 443 E. Paces Ferry Road Atlanta, Ga. 30305	Yes	Forecasting and inventory management	Yes	CICS and IMS DB/DC for some applications	Yes	Yes	No	IBM mainframes, System/38	Master scheduling, MRP, bill of materials, capacity planning, customer order processing,	sales forecasting, purchasing, materials management, production activity control
Dynamic Apollo Data Systems 2487 E. Orangethorpe Fullerton, Calif. 92631	Yes	Some accounting	Yes	No	Yes	Yes	No	Data General Corp.	Accounting modules, order processing/ invoicing, inventory control/ physical, report generator/ DBMS,	bill of materials/ routing, work order processing/ job costing, master scheduling/MRP, capacity planning, labor distribution
AID-MRS Applied Information Development, Inc. 823 Commerce Drive Oak Brook, Ill. 60521	No	Yes	No	No	Yes	Yes	No	IBM DOS/VSE, VM, MVS	Edit/parameter maintenance,** reporting,** distribution requirements planning, master production scheduling,	MRP, capacity requirements planning
Mac-Pac Arthur Andersen & Co. 33 W. Monroe St. Chicago, Ill. 60603	Yes	Yes	Yes	No	Yes	Yes	No	IBM mainframes, System/38, 36, 34	Capacity requirements planning, design engineering, distributed process control, inventory accounting,	manufacturing engineering, master scheduling, product costing, purchasing, shop floor control, MRP
Shannon Information System Axis Computer Systems, Inc. 730 Distel Drive Los Altos, Calif. 94022	Yes	No	Yes	No	No	Yes	HP, yes; DEC, No	HP 3000 DEC VAX	Accounting modules, manufacturing, order management, human resources, repetitive, projects,	business graphics, report generator, forecast maintenance, management reporting
AX/1000 Axis Computer Systems L.P. 730 Boston Post Road Sudbury, Mass. 01776	Yes	No	No	No	Yes	Yes	Yes	Prime, Unix System V-based systems	Accounting modules, bill of materials, purchasing/receiving, inventory control, master production schedule, MRP,	shop floor control, capacity requirements planning, job order costing, customer order processing

* This chart includes information from vendors that responded to a survey conducted by Oliver Wight Software Research, Inc. Further product information is available from the vendors.
** Required with all applications.

Source: Oliver Wight Software Research, Inc.

MRP II SOFTWARE

Product/Vendor	Real-Time Updates Available for All Applications	On-Line Query with Current Data Capability	Application Integrated with Data Base Management System	Application Integrated with Transaction Processing Monitor	Logic of Item Not Coded	Multinational	Online/Interactive Included as Part of Package	Operating System Environment	Modules
MR*PS Bernard Giffler Associates 34 Linda Lane Warrington, Pa. 18976	Yes	No	No	Yes	Yes	Yes	Yes	NEC Corp./ APC, APC III; Microsoft Corp. MS-DOS; Digital Research Inc. CP/M 86; Concurrent DOS-based machines	inventory, product/resource structures, MR²G: explode/net/ set-back schedule, ROS: planned and released order monitoring and control, work-in-process, capacity planning, product costing, cash flow planning,
Production Management System Boeing Computer Services Co. Software & Education Products Group P.O. Box 24346, MS 7W02 Seattle, Wash. 98124	Yes	On-line with real-time update	Yes	Not applicable	No	Yes	Yes	HP 3000, IBM 4300 series and up	Bill of materials, inventory control, MRP, capacity requirements planning, shop floor control, labor data collection purchase requisition
BAMCS Burroughs Corp. 1 Burroughs Place Detroit, Mich. 48232	Yes	No	Built on DMS II DBMS	Uses Gemcos or Coms tele-processing monitor	No	Yes	No	Burroughs Corp. A 3, A 9, A 10, A 15	Business foundation — data base, inventory, configurator; business planning — scheduling and shop floor control, master production scheduling. MRP, capacity requirements planning;
Cosbolt Manufacturing Cincom Systems, Inc. 2300 Montana Ave. Cincinnati, Ohio 45211	Yes	Yes	Yes	Yes	Yes	Yes	No	IBM 4300 series 30 series, DEC VAX-11/780, VAX 8600	Bill of materials, material control master production scheduling, MRP, shop floor control,
Integrated Manufacturing System Computer Covenant Corp. 790 Farmington Ave. Farmington, Conn. 06032	Yes	No	No	No	Yes	No	No	DEC PDP-11, VAX; IBM Personal Computer; Microsoft Xenix; Unix-based systems	Quotation/estimating, order entry/invoicing, bill of materials/ routing, materials inventory/ purchasing, tool inventory, job costing, production planning, shop floor control, MRP,
Growth Power Computer Solutions, Inc. 1 Burlington Woods Drive Burlington, Mass. 01803	Yes	Yes, financial modules	Yes	Yes	No	Yes	Yes	HP 3000	Accounting modules, inventory control, shop floor control, MRP, capacity requirements planning,
AMAPS/3000 Comserv Corp. 3400 Comserv Drive Eagan, Minn. 55122	Most transactions	Optional	No	No	Yes	Yes	No	HP 3000 Series 37, 42, 48, 58, 68	Accounting modules, bill of materials, material control system, MRP, process and routing system, shop floor control,
AMAPS-Q Comserv Corp. 3400 Comserv Drive Eagan, Minn. 55122	Most transactions	Optional	No	No	Yes	Yes	No	4300, 3080, 3090	Bill of materials, material control system, MRP, shop floor control, capacity requirement planning, master production
Activator Control Data Corp. Business Information Services 500 W. Putnam Ave. Greenwich, Conn. 06830	Yes	Yes	Yes	Yes	No	Yes	Yes	4300 30 series, Wang Laboratories, Inc. VS	Materials management, operations planning, operations control, purchasing, product structuring, cost management,

Product/Vendor	Modules
MR*PS	demand/usage forecasting, selective regeneration
Production Management System	release, master production schedule, government reporting option
BAMCS	purchasing management — purchasing, accounts payable; financial management — standard cost, manufacturing accounting; customer management — order entry, accounts receivable
Cosbolt Manufacturing	purchasing, cost management, order entry, lot/serial number traceability
Integrated Manufacturing System	factory data collection
Growth Power	purchasing, bill of materials, master production scheduling, sales orders, labor reporting
AMAPS/3000	capacity requirement planning, purchasing control system, lot traceability system, master production scheduling
AMAPS-Q	scheduling, cost development system, cost management system schedule managed production, management reporting system
Activator	distribution planning, quality assurance

Product Spotlight/MRP II Software

Product/Vendor	Real-Time Updating Available for All Transactions	On-Line Entry with Delayed Batch Updating	Applications Integrated with Data Base Management System	Applications Integrated with Telepromising Monitor	Logic of MRP Not Change	Regenerative	Digital/Telepromising Monitor Provided as Part of Package	Computer Hardware Environment	Selected Functions
E-Z-MRP C. R. Smolin, Inc. 5230 Carroll Canyon Road San Diego, Calif. 92121	Yes	No	No	No	No	Yes	No	Runs on any MS-DOS-, PC-DOS- or Digital Research CP/M 80-based system	Bill of materials; MRP includes on-line inventory control, purchase order and work order entry and tracking, sales order and forecast information
Cullinet Applications Systems-Manufacturing Cullinet Software, Inc. 400 Blue Hill Drive Westwood, Mass. 02090	Yes	Yes	Yes	Yes	Yes	Yes	No	IBM mainframe, 370, 4300 or higher	Accounting modules, bill of materials, master production scheduling, inventory control, MRP, customer order entry, shop floor control, purchasing, cost control, personnel
MRPS 36-S Data 3 Systems, Inc. 2544 Cleveland Ave. Santa Rosa, Calif. 95401	Yes	Labor, bill of materials transactions	No	Not applicable	No	Yes	Not applicable	System/36, 34	Forecasting; rough cut capacity plan; order entry; two-level master schedule; product structuring; inventory, purchase order, work order management, MRP; shop floor control; detail capacity plan; standard product and work-in-process cost
MRPS 38-S Data 3 Systems, Inc. 2544 Cleveland Ave. Santa Rosa, Calif. 95401	Yes	Labor, move transactions	No	Not applicable	Yes	Yes	Part of System/38 operating system	System/38	Forecasting, production plan; rough cut capacity plan; order entry; two-level master schedule; product structuring; inventory, purchase order work order management; MRP; shop floor control; detail capacity plan; standard product and work-in-process cost
QED Data Systems for Industry 3942 Cerritos Ave. Los Alamitos, Calif. 90720	Yes	No	Yes	Yes	Yes	Yes	Yes	HP 3000 Stratus Computer, Inc./32, IBM System 88	Master monitor program, inventory control processing, bill of materials, processing, work order processing, procurement requirements process, net resource planning, routing/work center process, job cost processing, shop floor processing, standard cost generation
Datafile Datawerks Corp. 5752 Oberlin Drive San Diego, Calif. 92121	Yes	No	Yes	Yes	Yes	Yes	Yes	McDonnell Douglas, ADDS; IBM Series/1	Engineering, MRP, inventory control, purchase order, work order, sales order, accounts receivable, accounts payable, general ledger, payroll
SMC-Systems for the Manufacturing Co. DBSI Information Systems, Inc. Suite 110 25431 Cabot Road Laguna Hills, Calif. 92653	All but general ledger	General ledger posting	No	No	Yes	Yes	Not applicable	VAX, AT&T, NCR Tower, Texas Instruments, Inc., Unix System V hardware	Product definition, purchasing/receiving, production control, inventory control, material planning, production planning, accounts payable, accounts receivable, general ledger, order processing
Keystone Diversified Data Systems 2601 N. Fairview Ave. Tucson, Ariz. 85705	Yes	For large-volume data collection activities	No	No	Yes	Yes	No	Perkin-Elmer Corp., Wang	Repair order, inventory control, bill of materials, forecast/MRP, job routing, job order, schedule order, dispatching, job tracking/labor effort, capacity requirements planning/management reporting
SUZYMRP Driver-Harris Systems, Inc. No. 4 Airport Industrial Campus Little Ferry, N.J. 07643	Yes	No	No	Local-area network implementation	Yes	Yes	Yes	IBM Personal Computer and compatibles, Alpha Micro-systems, Inc. micro	Base module includes inventory control, bill of materials, order processing and system management; MRP; master production scheduling; resource requirements planning; shop floor control; capacity requirements planning; accounting modules

MRP II SOFTWARE

Product	Does this system support the use of an independent data base?	On-line data entry with automatic data base updating?	Does system use a data base management system?	Does system integrate with other software?	Does system support the use of bar code?	Does system support the use of a fourth generation language?	Does system support the use of a relational data base?	Hardware	Modules	Other features
Manufacturing Management and Control — MMC Escom, Inc. 10502 N.E. 37th Circle Kirkland, Wash. 98033	Yes	No	Yes	Yes	Yes	Yes	No	Prime: Series/1 4300 series, Personal Computer AT, Honeywell DPS 6; VAX	Engineering entry, master scheduling, sales order purchasing, inventory planning, work order processing, purchasing, work-in-process costing, shop floor control, standard costing, financial modules	
PERMAR/MPS; PERMAR/Process MPS; PERMAR/Financials Formation, Inc. 823 E. Gate Drive Mount Laurel, N.J. 08054	Yes	No	Yes	Yes	Yes	Yes	Yes	4300 series, 3000 series, IBM compatibles	Master scheduling, MRP, capacity requirements planning, shop floor control, purchasing/receiving,	inventory management, subcontract purchasing, costing, financial reporting, resource requirements planning
MC/P Gathers Software, Inc. 3888 E. 45th Ave. Denver, Colo. 80216	Yes	No	Yes	Yes	Yes	Yes	Yes	Any Pick Systems Pick-based system	Bill of materials and port master maintenance, inventory control, master production scheduling and forecasting,	MRP, resource requirements planning, production control, purchasing, receiving and inspection
HP Manufacturing Management II Hewlett-Packard Co. Building 60-I, 2038 Bruhan Lane San Jose, Calif. 95124	Yes	No	Yes	Yes	No	Yes	Yes	HP 3000	Accounting modules, MRP, master scheduling, purchasing, sales order management, production cost	management, shop floor control, capacity requirement planning, bill of material
Honeywell Distributed Manufacturing System — HDMS Honeywell, Inc. Honeywell Plaza Minneapolis, Minn. 55408	Yes	No	Yes	Yes	Yes	Yes	No	DPS 6	Accounting modules, bill of materials, inventory control, purchasing, work-in-process, MRP,	master scheduling, capacity modeling/planning, costing/financial planning, sales order processing
Honeywell Manufacturing System — MMS Honeywell, Inc. Honeywell Plaza Minneapolis, Minn. 55408	Yes	Optional	Yes	Yes	Yes	No	No	Honeywell DPS 90, DPS 88, DPS 8, DPS 7	Inventory record management, manufacturing data control, MRP, master production scheduling,	statistical forecasting, capacity requirement planning, purchased materials control, production cost accounting
Communications-Oriented Production Information and Control System — COPICS IBM Old Orchard Road Armonk, N.Y. 10504	Yes	No	Yes	Yes	Yes	Yes	No	370, 30, 4300 series	Bill of materials, on-line II, on-line routing, facilities data management, customer order servicing/data management/order management/shipping management,	master production schedule planning, inventory accounting II, advanced function MRP II, capacity requirements planning
System/38 Manufacturing Accounting and Production Information Control System — MAPICS II IBM Old Orchard Road Armonk, N.Y. 10504	Yes	Yes	Data Base Organization and Maintenance Processor (DBOMP)	Part of the system	Yes	Yes	Part of system software	System/38	Accounting modules, cross-application support, inventory management, product data management, MRP, capacity requirements planning, order entry and invoicing,	production control and costing, data collect system support, sales analysis
System/36 MAPICS II IBM Old Orchard Road Armonk, N.Y. 10504	Yes	Yes	DBOMP techniques	Part of the system	Yes	Yes	Part of system software	System/36	Accounting modules, inventory management for processing, cross-application support, inventory management, product data management,	MRP, forecasting, location/lot management, capacity requirements planning, production control and costing
MRP Card System MCS Interactive Applications, Inc. 2316 Walsh Ave. Santa Clara, Calif. 95051	Yes	No	Yes	No	Yes	Yes	No	Burroughs B195, A 3, XE 550	Item master, bill of materials, inventory control, purchasing, work in process/shop floor control,	MRP/capacity requirements planning, cost accounting, financial accounting,
IMCS Interactive Information Systems, Inc. 505 N. Alvernon Way Tucson, Ariz. 85711	Yes	No	Yes	No	Yes	Yes	Yes	VAX, AT&T, IBM, Stratus	Accounting modules, order entry/invoicing, inventory, shop floor control, master schedule, MRP,	manufacturing standards data base (bill of materials and routing), purchasing, capacity requirements planning

Product	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Manufacturing III Intro-Logic, Inc. Suite 200 24700 Northwestern Highway Southfield, Mich. 48075	Yes	Yes	No	No	Yes	Yes	Not applicable	System/34, 36	Bill of materials, inventory control job costing, production scheduling and reporting, purchasing,	order entry, sales forecasting/analysis, shipping/receiving/invoicing
Not Historical Status (MRP II) Jacobson and Associates, Inc. 10229 Lower Azusa Road Temple City, Calif. 91780	Yes	No	No	Yes	No	Yes	No	DG Desk Top, Eclipse, MV series	Sales forecast, sales backlog, master production schedule, rough cut capacity planning, perpetual inventory,	purchasing, work in process, full management exception reports, multiple-level pegging
Jobtrak 2 Jobtrak Systems, Inc. 7269 Flying Cloud Drive Eden Prairie, Minn. 55344	Yes	No	Yes	Yes	Yes	Yes	Yes	Ultimate	Material control core, MRP, labor system core, production system core, job control core,	job cost, data collection, general ledger, accounts receivable, accounts payable
Leland Leland, Inc. Suite 626 6601 Dunwoody Place Atlanta, Ga. 30338	Yes	Yes	Yes	Yes	Yes	Yes	No	3030 series, 4300 series, 370	Purchasing, receiving, requisitions, customer order servicing	
Mytie Mytie MRP II Software M&D Systems, Inc. Box 108 3885 N. Buffalo Road Orchard Park, N.Y. 14127	Yes	No	No	Not applicable	No	Yes	No	IBM Personal Computer, Personal Computer XT, AT, System/36; Novell, Inc. Networks; Altos Computer Systems, Inc.; AT&T 382	Manufacturing standard cost system, production forecast/scheduling, MRP, manpower planning, production order processing, shop floor control, order entry/billing, inventory control, sales analysis, accounting modules	
The Medic System Medic Corp. 3980 Freedom Circle Santa Clara, Calif. 95054	Yes	No	No	No	Yes	Yes	No	Prime 50 series, 4300 series	General system modules, inventory module, bill of materials, work in process, purchasing,	cost accounting, MRP II/master scheduling, marketing, corporate planning, project control
The Expert Series for Manufacturers Management Science America, Inc. 3445 Peachtree Road N.E. Atlanta, Ga. 30326	Most transactions	Optional	No	No	Yes	Yes	Environment dependent	IBM mainframes (360, 370, 4300 series and 30 series)	Manufacturing standards, inventory control, advanced inventory management, order processing, master production scheduling, MRP,	service demand forecasting, shop floor control, capacity requirements planning, purchasing
Manufacturing Decision Support System — MDSS Manufacturing Decision Support Systems, Inc. 300 E. Ohio Building 1717 E. 9th St. Cleveland, Ohio 44114	Yes	No	Yes	Yes	Yes	Yes	Included with hardware	HP 3000	Material control, shop floor control, job cost and labor efficiency, accounts payable, general ledger, financial statements and budgetary control, sales and marketing	management
Manufacturing Control System Manufacturing Solutions & Systems 1300 S. Calhoun Road Brookfield, Wis. 53005	Yes (except labor)	Labor	No	No	No	Yes	No	System/34, 36	Engineering data base, standard product costing, in-process data base, job/inventory costing, stock-locator system, MPS/MRP,	capacity requirements, physical inventory/cycle count, formal purchasing system
Advanced Integrated Manufacturing Software — AIMS Mortak, Inc. Suite 119 Corporate Sq. 535 N. Gale Ave. Westmont, Ill. 60559	Yes	No	No	No	Yes	Yes	Yes	IBM Personal Computers and compatibles	Production planning system, sales management system, materials management system, quotation system, custom report generator, financial management system/	accounts receivable, financial management system/accounts payable, financial management system/general ledger
Accounts Payable MCBA, Inc. 2441 Honolulu Ave. Montrose, Calif. 91020	In some cases	In some cases	No	No	No	Yes	No	PDP-11, Altos 586	Accounting modules, bill of materials processor, standard product routing, standard product costing,	shop floor control, MRP, labor performance, job costing, customer order processing, inventory management purchase order and receiving

MRP II SOFTWARE

Product/ Vendor	Bills from Unknown Materials for All Assemblies	On-Line Shop Floor Control Subsystem	Automatic Interface with Bank Data Management System	Automatic Interface with Purchasing Subsystem	Lots of MRP Use Changes	Automatic Interface	Bills/Transactions Interface with Financial Accounting Subsystem	Automatic Interface	Other
PMS McCormack & Dodge Corp. 1225 Worcester Road Natick, Mass. 01760	Yes	Only for bill of materials structure	Yes	Yes	Yes	Optional	No	VAX running on VMS, 4300 series, 30 series	Master production schedule, bill of materials, inventory control, MRP, shop floor control, purchasing management, cost management, customer order entry
C/PMS McCormack & Dodge Corp. 1225 Worcester Road Natick, Mass. 01760	Yes	Only for bill of materials structure	Yes	Yes	Yes	Optional	No	30 series	Master production schedule, bill of materials, inventory control, MRP, shop floor control, purchasing management, cost management
Manufacturing Planning and Control — MPAC McCullough and Associates, Inc. 1401 N. Jesse James Road Excelsior Springs, Mo. 64024	Yes	No	No	No	Yes	Yes	No	Alpha Micro-systems	Inventory control, bill of materials, production control, MRP, master scheduling, capacity planning, order entry, purchasing/receiving, fixed-asset depreciation
MCS-3 Micro Manufacturing Systems, Inc. 2800 Corporate Exchange Drive Columbus, Ohio 43229	Yes	No	No	No	Yes	Yes	No	Any hardware and operating system supported by Ryan-McFarland Corp. Cobol	inventory control/ bill of materials, MRP, shop floor control/ job costing, customer order entry, capacity requirements planning, purchase order control, financial resource planning, report writer
MAX, The Production Manager Micro-MRP, Inc. 1065 Hillsdale Blvd. Foster City, Calif. 94404	Yes	Interface	Yes	Not applicable	Yes	Yes	Yes	IBM Personal Computer, Personal Computer XT, AT, 5531, 7531, 7532	Bill of materials, inventory, master scheduling, MRP, purchasing, shop floor control, management performance, interface, cost, OEM-TCS accounting
Integrated On-Line Non-Stop Manufacturing — IONM Mitec, Inc. 267 Kappa Drive Pittsburgh, Pa. 15238	Yes	Yes	Yes	Yes	No	Yes	No	Tandem Computers, Inc.	Engineering standards and IDEM Master, order entry and release order scheduling, master resource scheduling, shop floor control and scheduling, capacity planning and leveling, time and attendance, purchasing control, cost control and accounting, inventory control and scheduling
MRP Bill of Material Mini/Micro Computer Systems, Inc. Suite 1500 2401 W. Hassell Road Hoffman Estates, Ill. 60195	Yes	Yes	No	No	Yes	Yes	No	Point 4 Data Corp., DG	Bill of materials with pyramid costing, inventory with purchasing, routing/costing, MRP, capacity requirements planning/labor, distribution, scheduling/forecasting, order entry/billing
MIMS Mirel, Inc. 800 W. Cummings Park Woburn, Mass. 01801	Yes	Yes	Yes	Yes	No	Yes	Yes	IBM 4300, 3080	MIMS (VM) / MIMS (MVS), application extension (VM/ MVS), MFG/MMS (materials), MFG/INV (inventory), MFG/SOM (shop) ACC/AR (accounts receivable) ACC/CM (cash management) MIMS/Lights Out
Fourth Shift MFG Software Corp. 3400 Cornsery Drive Eagan, Minn. 55122	Yes	No	Yes (MDBS III)	Yes (Formix)	Yes	Yes	Yes	Personal Computer AT	Inventory control, bill of materials, general ledger, purchasing, accounts payable, MRP and MPS, multiuser, product costing, accounts receivable, order entry
Manolin NCA Corp. 3250 Jay St. Santa Clara, Calif. 94054	Yes	No	Yes	Yes	No	Yes	No	DEC	Accounting modules, sales/marketing modules, inventory, bill of materials, work order, shop routing, purchasing, MRP, master scheduling/capacity management, R/FLX (repetitive manufacturing)
Miscelos-II NCR Corp. 1700 S. Patterson Blvd. Dayton, Ohio 45479	Yes	No	Yes	Yes	No	Yes	Yes	V-8500 V-8600	Accounting modules, bill of materials, routing, cost, master production scheduling, MRP, capacity requirements planning, inventory management system, work in process, purchasing/receiving

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MRP II SOFTWARE

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NCR Interactive Manufacturing Control System II — NCR IMCS II NCR Corp. 1700 S. Patterson Blvd. Dayton, Ohio 45479	Yes	Optional	Yes	No	No	Yes	Yes	9100, 9300, 9500, I-Tower	Bill of materials, inventory management, MRP, routing, work in process, capacity planning, order processing,	purchasing/receiving, master production scheduling, accounting interface
Manufacturing/36 New Generation Software, Inc. Suite 200 3840 Rosin Court Sacramento, Calif. 95834	Yes	No	Yes	Yes	Yes	Yes	No	System/36	Accounting modules, financial reporting and management, planning and control system (PACS), planning data base, control data base,	master production schedule and MRP, capacity management, priority dispatch, standard cost, standard job order costing
Reapond Oriole Software, Inc. Oxford Building 630 8600 LaSalle Road Towson, Md. 21204	Yes	Optionally available for some functions	Yes	Yes	Yes	No	No	Tandem EXT, TXP and Non-stop systems	Manufacturing data base, master planning and scheduling, capacity requirements planning, MRP, material and inventory	control, shop floor control, manufacturing accounting, procurement management, management audit and control
Plexus Fine Instrument Co. 101 Industrial Drive Grove City, Pa. 16127	Yes	No	Yes	No	Yes	Yes	No	PDP-11, PDP-11/23, and up using RSX-11M operating system	Accounting modules, inventory control, bill of materials, master production schedule, MRP, shop floor control,	labor reporting, capacity planning, purchasing, sales forecasting
PCMAP/3000, PAB/3000, DIST/3000 Players Computer, Inc. 140 Adams Blvd. Farmingdale, N.Y. 11735	Yes	No	Yes	No	Yes	No	No	HP 3000	Accounting modules, work order, order entry, purchase order, engineering, MRP,	cost accounting, sales analysis, inventory control, physical inventory
[illegible]/36 Professional Computer Resources, Inc. 2 Midamerica Plaza Oakbrook Terrace, Ill. 60181	Yes	No	Yes	Not applicable	Yes	Yes	Not applicable	System/36	Accounting modules, master production scheduling, MRP, product structure, product standard costing, shop floor control	and costing, capacity requirements planning, inventory control, purchasing and receiving, order processing and billing
Profitkey Manufacturing System Profitkey International 200 Prestige Park Salem, N.H. 03079	Yes	No	Yes	No	No	Yes	No	Personal Computer AT, AT&T 3B series, Tower series	Accounting modules, basic manufacturing, shop floor control, master scheduling, MRP, loading and scheduling,	purchasing, customer management, report writer
Predator Predator Production Software, Inc. 15 Seeley Ave. Piscataway, N.J. 08854	Yes	No	No	Yes	No	Yes	Yes	VAX, HP 3000, IBM Personal Computer, System/36, Siemens AG, Tower	Module 1: bill of materials, inventory; Module 2: work centers, routings, standard cost accounting; Module 3: work in progress, job costing;	Module 4: MRP; Module 5: purchasing; Module 6: MPS
MPS/PRO QAD Systems 1005 Mark Ave. Carpinteria, Calif. 93013	Yes	Yes	Yes	No	Yes	Yes	Yes	Personal Computer XT, AT, Fortune Plexus, 382	Bill of materials, work centers/routings, purchase orders/vendors, work orders, inventory control, shop floor control,	resource planning, master schedule planning, MRP, capacity requirements planning
Infinesse Relevant Business Systems, Inc. 162 Hillview Drive Milpitas, Calif. 95035	Yes	No	No	No	Yes	Yes	No	Alpha Micro-systems, IBM Personal Computer, DEC Micro-vax II	Accounting modules, item master/ bill of materials, design engineering, master scheduling, sales order entry, inventory control, purchasing control, shop floor control/	capacity planning, tooling control, project control
PRO-MAN RSD, Inc. 12916 N.E. 125th Way Kirkland, Wash. 98034	Yes	No	Yes	Yes	Yes	Yes	Yes	Personal Computer XT, AT, Series/1, 4300; DEC; Honeywell; Pick operating systems	Accounting modules, bill of materials, master schedule, inventory control, scheduled receipts, MRP, capacity plan and routing, purchasing, shop floor control,	sales analysis

Product Spotlight/MRP II Software

Product	Data flow between modules for all	Online entry for all	Data base management system	Relational data base management system	Logic of MRP Online	Simulation	Direct/Indirect labor included as part of product	Operating system		Other
Safco-2000 Safe Computing Ltd. 89-91 High St. Leicester, England	Yes	No	Yes	Yes	No	Yes	Yes	Micro-Vax, VAX	Bill of materials, costing and cost simulation, sales, purchase and work order maintenance, inventory control, MRP, work-in-process and capacity planning.	sales order processing and invoicing, purchase order processing, financials, fourth-generation language, enquirer/report writer
Manufacturing Control Systems Scientific Computers, Inc. 10101 Bren Road E. Minnetonka, Minn. 55343	Yes	Yes	No	Yes	Yes	Yes	Not applicable	National Advanced Systems Corp. (IBM compatible)	Bill of materials/routings, capacity planning, factory (bar code) data collection, inventory control,	MRP (Pegged) order entry invoicing, purchasing, shop floor control, work in process, financials
Mat-Pac Spar Associates, Inc. 927 West St. Annapolis, Md. 21401	Yes	No	Optional	No	Yes	Yes	Yes	HP 3000; Prime 550, 750; DEC PDP-11/780 series, Eclipse	Mat-Pac Basic; 7000.2 cost/schedule control reporting, stock inventory, material transfer, supplier invoice, pallet module,	excess material, customized purchase order, scheduling
Contract Planning and Control System For Defense — CPACS/D Sperry Information Systems P.O. Box 500 Blue Bell, Pa. 19424	Yes	Yes	Yes	Yes	No	Yes	No	Sperry Series 1100	Engineering and manufacturing data control (including product costing), bill of materials, master production schedule, inventory management (including MRP by contract),	shop floor control, on-line data collection, purchasing (including detail inspection), order entry, capacity requirements planning, contract estimating
Sperry Manufacturing Business Solution — MBS Sperry Information Systems P.O. Box 500 Blue Bell, PA 19424	Yes	Partial	No	No	Yes	Yes	No	Sperry 5000/40, 5000/60, 5000/80, 7000/40	Product definition, inventory control, purchasing/receiving, production control, material planning, production planning, sales order processing, accounts payable,	accounts receivable, general ledger
Purchasing-1100 Sperry Information Systems P.O. Box 500 Blue Bell, Pa. 19424	Yes	No	Yes	Yes	Not applicable	Not applicable	No	Series 1100	Supplier and quote processing, requisition processing, purchase order processing, receiving,	inspection
CIM/PCS Sperry Information Systems P.O. Box 500 Blue Bell, Pa. 19424	Yes	No	No	Yes	Not applicable	Not applicable	No	Series 1100	Material control, order release, order scheduling, time and attendance reporting, work plan and assignments,	production reporting, order monitoring, performance reporting, tool assignment, labor efficiency
CIM/MMS-1100 Sperry Information Systems P.O. Box 500 Blue Bell, Pa. 19424	Yes	Yes	Yes	Yes	Yes	Yes	No	Series 1100	Engineering data control, product costing, master production scheduling, inventory management (including MRP), capacity requirements	planning, customer order processing, inventory control and accounting, purchasing, shop floor control
Accumark Stolzberg Research, Inc. 3 Seabrook Court Stony Brook, N.Y. 11790	Yes	Yes (for allocations)	No	No	No	Yes	No	Personal Computer XT, AT; Radio Shack Corp. 6000	MRP MRP with lot (serial #1) control and traceability, multiuser	
Comprehensive Manufacturing Control System — CMCS STSC, Inc. 2115 E. Jefferson St. Rockville, Md. 20852	Yes	Yes	No	No	Yes	Yes	No	IBM 360/370, 30 series, 4300 series, HP 9000	Sales forecasting, finished goods includes: sales forecasting, inventory management, warehouse replenishment/distribution requirements planning,	replenishment planning manufacturing includes: master scheduling, MRP, capacity requirements planning, purchasing, shop floor control

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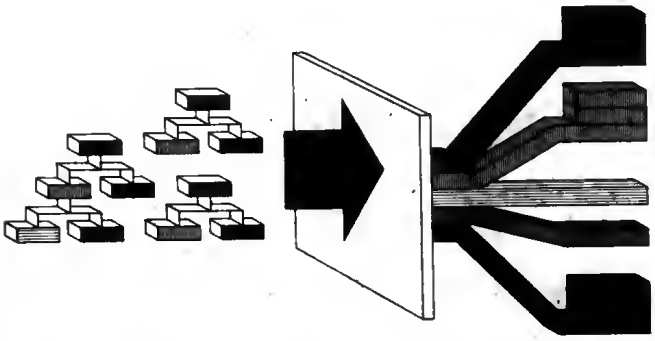
MRP II SOFTWARE

Product/ Vendor	Real-Time Updating Available for All Transactions	On-Line Query with Deferred Batch Updating	Application Integrated with Data Base Management System	Application Integrated with Transaction Monitor	Logic of MRP Not Coded	Supervisor	MRP/Transaction Monitor Provided as Part of Package	Computer Hardware Environment	Standard Production
CMI Profit Systems for Profit, Inc. 10335 W. Oklahoma Ave. Milwaukee, Wis. 53129	Yes	No	No	No	Yes	Yes	No	Personal Computer AT, Altos, Tower series, Sperry 5000 series, Zilog, Inc., System/36, 38	Accounting modules, order processing, sales analysis, inventory management, multilevel bill of materials, purchase order processing, production control, MRP, financial planning, capacity planning
Manufacturing Control System — MCS Systems Management, Inc. 6300 N. River Road Rosemont, Ill. 60018	Yes	No	DBMS integrated with Pick operating system	Tele-processing monitor integrated with Pick operating system	No	Yes	Included in Pick operating system	4300 series, Series/1, Ultimate, CIE Systems, Inc. 680, Pick operating system, Honeywell, DEC, Prime, Microdata	Bill of materials, inventory control, production control, master schedule, cost control, routing, MRP, work in process, capacity planning, master planning
Manbose Systems Specialists, Inc. Suite 460 4101 McEwen Dallas, Texas 75234	Yes	No	Yes	No	Yes	Yes	No	MAI/ Basic Four, Inc., DG	Accounting modules, estimate, order entry, bill of materials, work order processing, material requests	planning, capacity planning, work in process, inventory control, purchase orders
TEC Advanced Manufacturing System TEC Computer Systems, Inc. 30 Tower Road Newton, Mass. 02164	Yes	Optional	Yes	No	Yes	Yes	No	VAX	Accounting modules, inventory control, bill of materials, master production scheduling, MRP, production control,	purchasing, costing/accounting, order processing, fixed assets
Command MPS Thomas-Laguban and Associates, Inc. 250 N. Patrick Blvd. Brookfield, Wis. 53005	Yes	No	Yes	Yes	Yes	Yes	No	IBM mainframes	MPS-rough cut, multiplant engineering records, standard cost buildup, manufacturing orders/ location inventory, labor SFC training, purchasing/receiving,	accounts payable, net change MRP, capacity requirements planning, sales order entry and distribution, accounts receivable, inventory accounting
Acco-Trak Trans Microsystems 1010 W. Taylor St. San Jose, Calif. 95126	Yes	Yes	Yes	Yes	No	Yes	No	Altos 2086, TI Buspro, Personal Computer AT	Accounting modules, inventory control, shop floor control, engineering, MRP, purchasing, capacity planning,	quality control, field service/warranty, sales order entry
MRP2 Twin Oaks, Inc. P.O. Box 136 7070 Point Douglas Road Cottage Grove, Minn. 55016	Yes	Yes	Yes	No	Yes	Yes	Yes	Personal Computer XT, AT	Item master, bill of materials, inventory, basic purchasing, cost development, router,	work order, material planning, shop floor control, capacity planning
Spider II Unio Digital Technologies 26 S. Water St. Batavia, Ill. 60510	Yes	Yes	No	No	No	Yes	Yes	PDP, VAX, 382	Accounting modules, inventory management, shop floor control, standard product costing, job costing, labor performance,	purchase order and receiving, standard product routing, fixed assets and depreciation, bill of materials processor
Pioneer Command Userware International 2235 Meyers Ave. Escondido, Calif. 92025	Yes	No	Integrated with User-11 DBMS	No	No	Yes	No	PDP-11, VAX	Accounting modules, inventory control, sales order processing and analysis, purchase order processing, production control,	bill of materials, MRP, fixed assets, capacity planning and master production scheduling
Xerox Business Management System Xerox Computer Services 5310 Beethoven St. Los Angeles, Calif. 90066	Yes	Yes	Yes	Yes	No	Yes	Yes	IBM mainframes	Accounting modules, production control, cost planning and control procurement, inventory control,	MRP, shop floor control, bill of materials, capacity planning, purchase order

IN DEPTH

A pragmatic response to relational rules



Too many companies try to implement relational DBMS without migration software that moves nonrelational data structures into the relational environment. One DBMS vendor says more attention has been given to E. F. Codd's relational theory than to users' real transition needs.

By Stephen Gerrard

A pundit once offered a system programmer's definition of "production":

Pro-duc-tion (pro-duk'-shen) n. — *unnecessary computer programs that interfere with the progress of testing.*

In a rather lighthearted way, this definition illustrates the frequent tendency of service organizations to forget why they exist. Systems support — in fact, the entire DP group — exists to serve the larger needs of the enterprise.

Sometimes, to get the job done, those in service organizations must find a way to work around the pressing needs of the enterprise as a whole. This is evident in the programmer's responsibility to devise a test for new applications without bringing production operations, upon which an organization may depend, to a halt.

This is the vital missing dimension in the recent controversy surrounding attempts to define and classify relational data base management systems as "pure," "faithful to the relational model" or "born again" [CW, Oct. 14; Oct. 21]. In the excitement of analyzing the relational model and various DBMS, one factor has been ignored.

Gerrard is vice-president and director of product marketing for Applied Data Research, Inc., a Princeton, N.J., systems software vendor.

Arguably, this factor is the most vital one, one that will impact organizations implementing a relational DBMS.

It is the factor of transition.

This article is not suggesting that relational DBMS theory is unimportant, nor is the article adopting an antiacademic posture. To the contrary, relational DBMS is indeed the wave of the future.

Some high-performance implementations already exist, and the technology is now entering the mainstream of commercial data processing.

But the big question is, How can companies make the change to relational technology? Far more attention has been given to the academics of the theory than to the very real transition needs of organizations. In fact, one can offer a "relational DBMS academic's" definition of production: unnecessary prerelational computer programs that interfere with the progress of proliferating pure data models.

It seems that what is unnecessary to one person is critical to another. While, from an academic viewpoint, having nonrelational data bases with which to contend may indeed be irritating, one must not forget that organizations depend on those data bases. Often, the very lifeblood of a company is the applications that are reading and updating those data bases.

Many organizations cannot interrupt their daily routines long enough to conduct complete rewrites of applications. And new applications often need to be related to data managed by old applications — these applications are not developed in a vacuum.

Toward a migration strategy

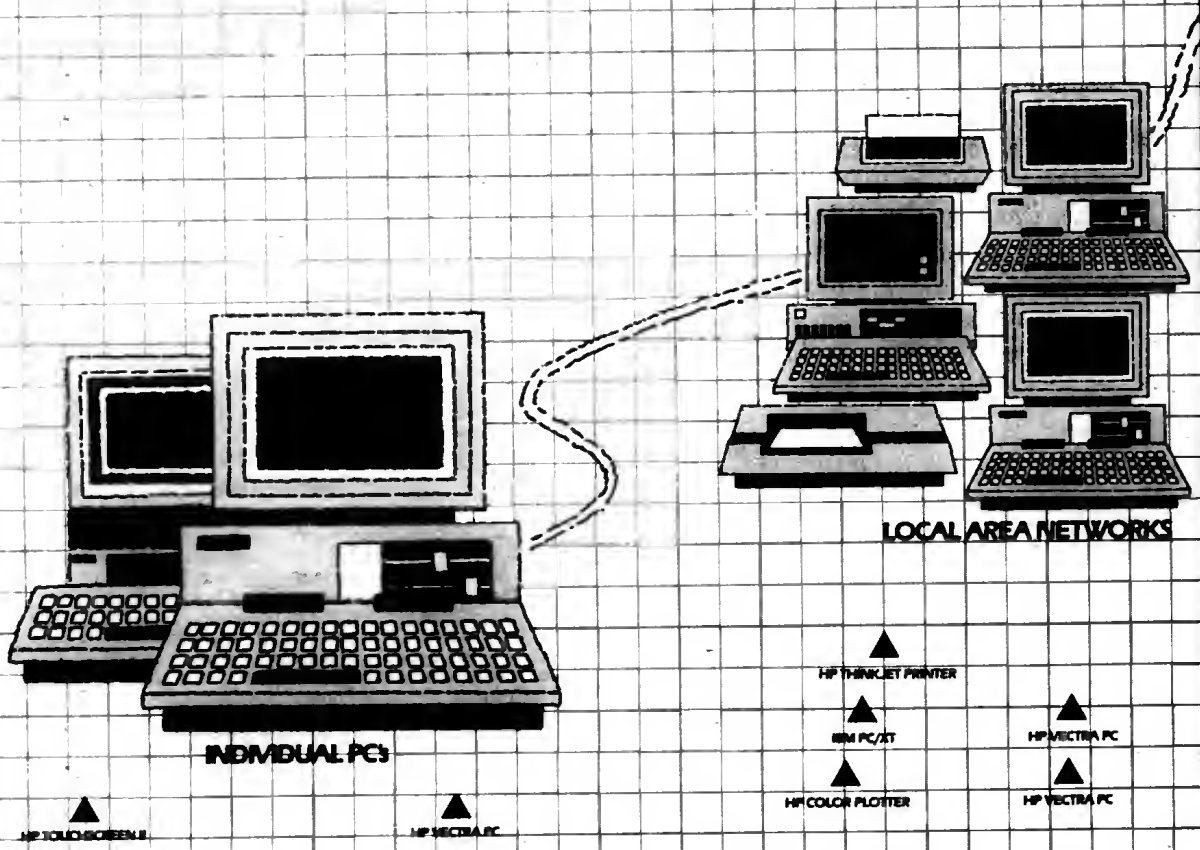
What a paradox. Relational systems are ballyhooed for their incredible ease of use, flexibility and high productivity of application development. Yet theoreticians tell us that we must rewrite all our computer applications before we can use the relational DBMS.

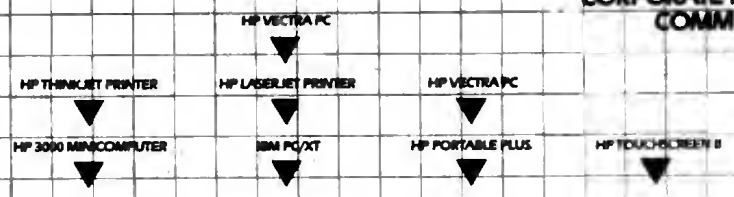
Viewed in this light, the cure may well be worse than the disease. Any productivity gains achieved through the use of a relational DBMS must be measured against the productivity decrease involved in wholesale application rewrites (Figure 1 page 66).

In his book *Technomics*, (Dow Jones-Irwin, Homewood, Ill., 1986) William Inmon identifies "interchangeability

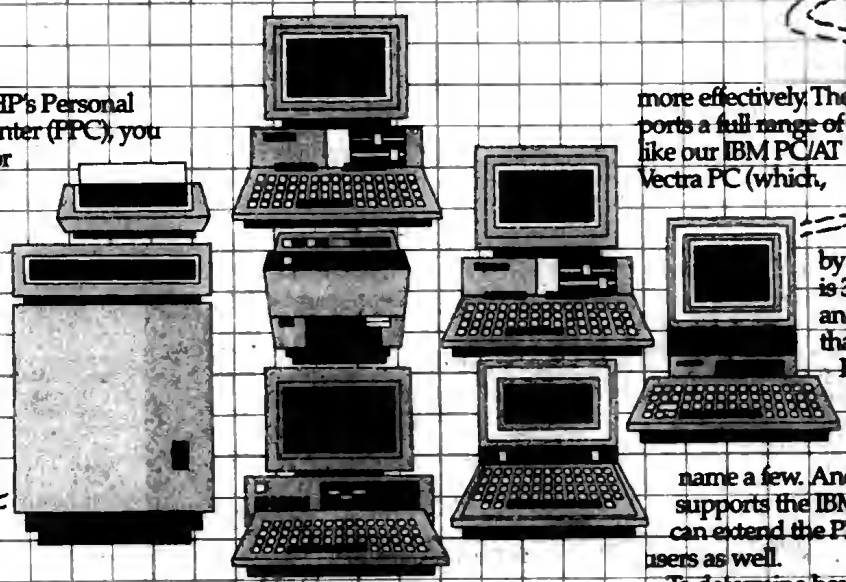
"What if...

you could grow from one PC to a network of a thousand without losing control?"





CORPORATE MAINFRAME COMMUNICATIONS



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of technology" as a key factor in the ultimate acceptance of any new technology. He poses and answers the following question:

"Does the new technology require that existing technologies be scrapped, or does it build upon the strengths of existing technology? The marketplace greatly reinforces technologies that do not call for wholesale displacement of existing technology."

There is a corollary here. The marketplace will greatly reinforce relational DBMS technology only if it can be implemented in ways that do not require the abandonment of key existing corporate applications.

Such implementations do exist. An important new branch of software technology is now evolving: migration software.

For years, conversion to newer, improved technologies has been a way of life in data processing. But recently, the mass of applications has grown to the point where large conversions simply cannot be meshed into normal DP priorities. Conversions now represent a formidable barrier to technological progress.

Migration software focuses on the barrier of conversion. It is rooted in the real-world problem of moving nonrelational data structures, and the actively used corporate applications built upon them, into more advanced relational DBMS environments.

Migration software differs significantly from conversion aids. Generally, conversion aids simply provide a power assist to a manual process. Program changes and recompilations still must be made, either manually or with a software assist; recompilations must be done; and extensive verification is required to ensure that no loss of functionality has occurred.

Migration software is quite different because it requires no changes to existing programs; that is, the application programs are not converted at all. Instead, a new DBMS environment is established that replaces the outdated one used by the applications. To permit the applications to continue functioning, migration software acts as a buffer, making the new DBMS appear like the old one. Thus, programs continue to execute, "thinking" that nothing has changed.

The roadblock of conversion

Conversions to new technologies are necessary if an organization wishes to avoid the specter of DP obsolescence and to take advantage of new advances. But though necessary, conversions are not easy or inexpensive.

Using traditional methods, data base conversion efforts can take years to accomplish — at great cost to the organization. Extensive expertise in both old and new DBMS is a must.

Anyone who has ever done a data base conversion can tell you that the only way to test fully and guarantee the success of a conversion is to make no application changes along the way. Thus, the whole effort is undertaken simply to reproduce the same application functions in a new, improved environment.

When converted, the applications will deliver no new facilities to the user community. Instead, the time and expense is incurred in hopes of positioning the DP department to provide greater benefits to the company later on.

Yet, organizations often cannot justify the expense of the conversion unless new features are added to an application in the process of conversion — or cannot resist the temptation to add them.

DP management thus faces an uncomfortable dilemma. If no conversion is undertaken, the enterprise will continue to operate using increasingly obsolete technology. But the costs of conversion are quite high in disrupted priorities and loss of productivity.

Automated conversion

The scenario described above is very real and opens the door for a new technology. To put it simply, data base conversions can be automated.

Migration software's benefits are numerous because the vast majority of time and uncertainty is removed from the task of conversion. With the data now residing in a more advanced relational DBMS, the organization can begin to exploit the advantages of the relational model. New subsystems can be added, and data base structure changes can be made without impact on the old or new application programs. Previously impossible ad hoc queries can now be made. Even previously unexploited data relationships can be used easily.

Under this type of conversion, the full power of the relational DBMS will not be tapped by the old applications. These applications operate oblivious to the fact that the relational DBMS is even there, since migration software fully simulates the old DBMS. The relational DBMS may even have to break some of the rules in order to provide full support to the old applications, a step with which relational data base purists disagree.

Styrofoam cups

To some strict relational adherents, using a relational DBMS to support applications originally developed using a nonrelational DBMS is akin to dining at an elegantly appointed banquet but using Styrofoam cups. Some people must have the luxury of going first class all the way. But for most of us, there are the occasional Styrofoam cups in life. In either case, the drink tastes the same.

A similar view separates some relational DBMS academics, dedicated

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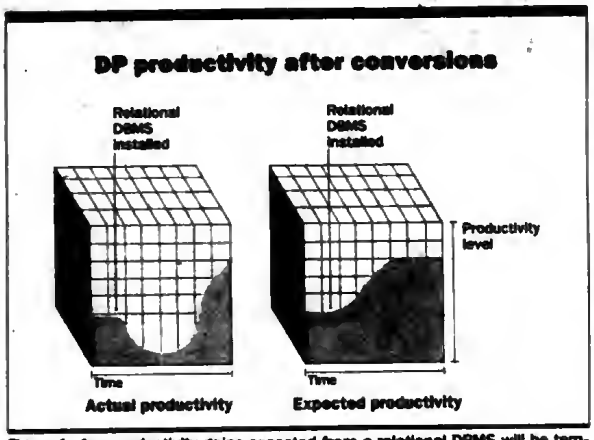


Figure 1. Any productivity gains expected from a relational DBMS will be temporarily offset by the productivity decrease involved in installing the system.

primarily to the advancement of relational theory, from DP professionals, who are responsible for addressing organizations' real, immediate information processing needs.

We could refuse to implement the relational DBMS until all applications are fully rewritten the relational way. But in the years it would take to accomplish this gigantic task, users would starve to death from an acute application backlog.

Migration software may not be the crystal goblet some would wish for, but it permits valuable business functions to continue to get done. Without an automated migration strategy, it is questionable whether a relational DBMS delivers enough of a productivity increase to offset the burden of application conversions.

Some are more equal

There are several examples of migration software available on today's market. Each product differs in the facilities it provides. It is possible, however, to identify a number of qualities that users should look for in a migration software product. These include automated data base redesign, automated simulation and performance.

Of paramount importance is that the new DBMS environment be significantly advanced in its technology and that it embrace the relational DBMS concept to benefit fully from the use of migration software. E. F. Codd, the acknowledged father of the relational model, states that no commercially available system today can be classed as "fully" relational, according to strict academic theory. However, some systems embrace the relational concept more fully than others; these now can deliver important benefits.

Migration to the new DBMS should result in better, quicker resolution of business problems. Those aspects of the relational model (tabular data storage; transparent growth and change; and SELECT, PROJECT and JOIN set operations) most needed by businesses today, along with good performance, are musts for the new environment.

Automated data base redesign. One of the most ticklish tasks in a conversion is the redesign of the data base. In fact, some believe that this process defies automation. However, advanced migration software can design the appropriate relational data base to accommodate arbitrarily complex nonrelational structure.

Migration software should design the new relational data base automatically by analyzing the control blocks of the older DBMS. By analyzing the old DBMS control blocks, such as DL/1 data base definitions and program specification blocks, migration software creates an equivalent relational design and populates the appropriate data dictionary or catalog.

This redesign can be accomplished because the relational model is a superset of the relationships supported by more limited systems. That is, relational DBMS can support the same complex tree structures that one finds in a hierarchical system such as DL/1 and even more complex relationships (Figure 2).

Migration software remaps the hierarchical structure to a relational tabular structure using straightforward rules. A segment in the tree becomes a table in the relational DBMS. The software maintains its hierarchical relationships by propagating the hierarchical position of a segment as a specific data item in the relational system's tables. Care is taken to accommodate future insertions into the hierarchy.

Migration software should ultimately permit a restructuring of data, assisting in the normalization of data that is not normalized. For instance, more than one record type often will be stored in the same file (this is very common in VSAM environments). The record is not normalized, but it is stored this way for performance reasons.

In such a situation, migration software should allow the single file to be split into multiple tables in the relational DBMS, thus promoting normalization and a more stable data base structure. With advanced relational technology, performance is not compromised in such instances, and the functions of existing applications are preserved.

Migration software also provides for the actual transfer of data, normally a one-time operation. The software will unload the data from the old DBMS and, using the newly populated data dictionary entries, reformat and load the data into the relational DBMS.

At this point, the data should be fully available to old and new applications. Also, it should now be available to new, higher order software tools such as query languages and application development systems.

Automated simulation. An important element of migration software is the execution-time simulation of the old DBMS environment. Remember, with true migration software, the application programs are not touched or modified in any way. It is the responsibility of the migration software to make the absence of the old DBMS transparent to application programs.

This is a most challenging aspect of building migration software. All of the idiosyncratic functions of the old DBMS must be recognized and supported by the migration software if the applications are to continue to operate.

For instance, if one is migrating away from a system such as DL/1, then all of DL/1's rules must be simulated. If under DL/1 a child segment cannot be accessed without first accessing its corresponding parent, then the migration software must enforce the same rule — even though a relational DBMS easily supports direct access to child records.

Performance. To accommodate an organization's unique operational and administrative needs, migration software must permit a gradual transfer of applications to the new relational DBMS. This means that in the case where a single program accesses more than one old data base file, migration software must support the situation where one file has been transported to the relational DBMS environment while the other remains behind.

Migration software must have very good performance at execution time. The move to relational DBMS cannot be justified if an organization can no longer afford to run its production applications.

Acceptable performance must be verified by parallel testing prior to cut over. Unlike lengthy conversions of the past, this verification can be done fairly soon after the migration software is installed because there is no hand conversion of programs. No irreversible commitment need be made until this important characteristic is satisfactorily proven.

Naturally, the goal of migration software is to provide performance improvements over the old DBMS. But the focus of the conversion should not be exclusively on performance. The major benefit of migration software is the new environment that is made immediately available and the elimination of traditional conversions.

New open doors

Even though supporting nonrelational call structures may entail some compromise with relational theory, the benefits of the migration software approach nevertheless are enormous.

Data is now stored in relations or tables. The relational DBMS allows new columns to be added to tables and new tables to be added to data bases, while the company's applications continue to do their job. The relational DBMS permits new relationships to be established, while the company's applications continue to operate.

Extensions to existing applications can be developed based on a relational concept. New applications can be developed with relational-based tools and integrated with the data in existing applications, all in a single, unified, shared-data environment. Also, new facilities, such as providing immediate access to end users, can be added to the relational DBMS.

Obligations

Inarguably, software companies have an obligation to provide upward compatibility for their users. This is indeed the missing link in IBM's dual-DBMS strategy of IMS and DB2.

Gone are the days when data processing people passively accept huge disruptions in their companies' priorities and the consequent large conversion projects, simply because their vendor provides no bridge. Today, companies are demanding that vendors supply new technologies and strategies for transition from their previous environments.

But software companies are not the only ones with an obligation. Theorists who propose new advances in technology — and relational DBMS is this type of advancement — also have an obligation to consider the transition costs imposed by the new technology. Only then will theories take their place in practical, everyday use and provide the benefits they promise. ■

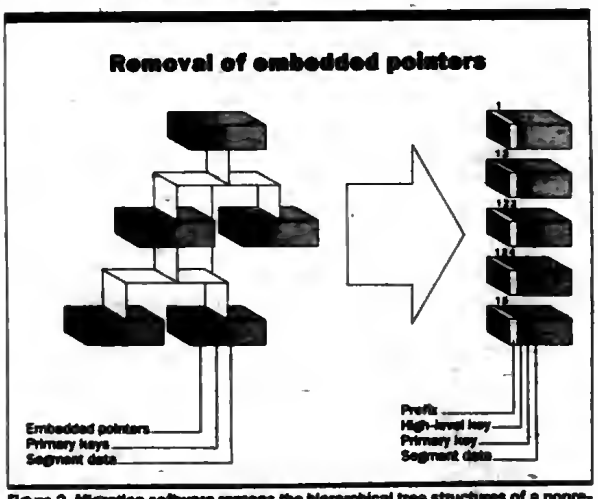
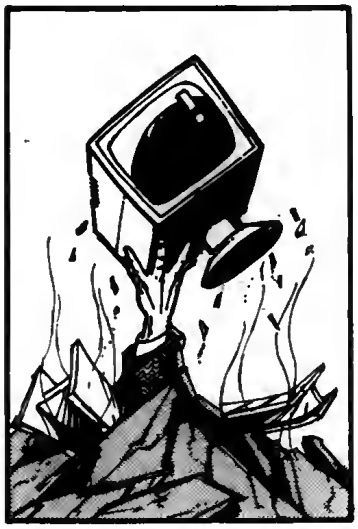


Figure 2. Migration software remaps the hierarchical tree structures of a nonrelational data base to a relational tabular structure automatically.

In Depth

Disaster recovery planning: Crisis doesn't equal catastrophe



Disaster recovery plans address day-to-day glitches, not just all-out data holocausts. Your plan should arise from DP's standard operating procedure, complete with user involvement and explicit corporate commitment.

By Ed Dugan

The earthquake in Mexico City and Hurricane Gloria along the East Coast brought down many information processing facilities in the affected areas and left them without basic functions for at least a week. The effects of these two recent disasters clearly demonstrate just how devastating catastrophic and near-catastrophic natural phenomena can be — and how a lack of planning can hinder the data processing recovery process.

These examples are somewhat extreme — or are they? When reduced to the data center level, the cause-and-effect relationship of disaster, to a greater or lesser degree, can similarly affect the ability of any company to maintain or continue business operations.

Disaster recovery is a corporate concern, not just a data center concern. Corporate management often misses this important point. There are many ways to approach disaster recovery planning, but too many of these lack the key element — corporate commitment in the form of acceptance of the concept, access to needed resources and staff commitment. When total commitment is absent, the following scenario is quite common.

The MIS/DP manager attempts to establish a disaster recovery project team. In doing so, the director may encounter the first of many obstacles — the end user. All too often, end users are reluctant or refuse to participate, citing many "valid" reasons: "It's not my responsibility"; "It's an MIS function"; "I don't have the time or the staff"; and so on.

To expedite the project, the MIS/DP manager decides to limit the focus of the project to the MIS function or the data center. One to two months have elapsed.

Once the project team meets, the process of defining the project's scope and objectives begins. This process of discovery involves the following considerations:

- Typically, where standards exist, they are not enforced. Where they do not exist, they must be implemented for the plan to be fully effective.
- Processing priorities are not clearly defined or understood. There is little sense of critical vs. noncritical, test vs. production and so on.
- There is insufficient manpower or expertise to devote to a project of this size. The programming staff's time is 150% committed to user-requested or user-funded projects — the rest of the time they do maintenance. The data center staff has already requested additional staffing just to keep up with its current work load.

The long and winding road

The project team looks for alternatives:

- Reducing the scope of the project further — usually not an acceptable alternative.
- Attempting to justify additional staffing for the project — not in the budget.
- Hiring a consultant — a possibility, if you have not yet spent all of the budget.

The team begins the search for an independent consultant or consulting firm specializing in disaster recovery, and a proposal request is issued. Three to six months have now elapsed; after all, this is only a part-time effort.

The contract is awarded. Weeks filled with definition, interviews, questionnaires and recommendations ensue. Only one or two MIS people, however, are required to work with the consultants. The consultants then disappear to prepare the initial draft for review. Six to nine months have passed.

About six weeks later, the consultants schedule the first run-through. They offer a rather detailed plan that will generally provide a means of establishing or reestablishing data center operations in the event of a major disaster — as it has been defined. However, without a corporate commitment and full user involvement, the basic business requirements of the corporation are not sufficiently addressed.

The draft plan is then stripped of

Dugan is a partner and senior management consultant in Edge Tech Associates, a San Francisco-based firm specializing in corporate automation and telecommunications integration planning.

political implications and innuendos, reduced to cover a more limited disaster and sent back to be finalized — another three to six weeks.

After eight to 12 months, the final product is ready. The consultants deliver a credible product and meet contractual commitments.

A few problems left

At this time, depending upon the firm's corporate structure, the MIS manager and the consultants make the final presentation, which goes well, and the plan is accepted. In the event of a disaster in the data center, the company's system will be up within 48 to 72 hours.

Only a few minor problems remain to be resolved:

- What about the end users? Are they aware of the plan? Are they able to support it? How do they participate in the recovery process?
- With this approach, it will be necessary in the future to "retrofit" end users to the plan. Adjusting and retraining often will take as long to complete as the original plan, will require more effort and will antagonize users because they must now fit into a process they had no part in developing.
- How will the plan be tested? Without corporate commitment and user participation, will the semiannual or quarterly testing called for in the plan be realistic?
- How will the plan be maintained and updated to reflect future changes such as call lists, configurations or software?

Without total corporate commitment to the resources, funding and user involvement required to develop and maintain a fully effective disaster recovery plan, it is questionable whether the MIS manager's ability to recover the data center or its processing functionality will be enough to ensure the ongoing operation of the corporation.

> ***Without total corporate commitment to a fully effective disaster recovery plan, it is questionable whether the MIS manager's ability to recover the data center will be enough to ensure the ongoing operation of the corporation.***

The edict approach

A disaster recovery plan that lacks corporate commitment typically will provide for little more than the ability to reestablish functional hardware operation at some remote location. This minimal provision is more common than most MIS/DP managers are willing to admit. Typically, the plan is motivated by the need to satisfy a corporate edict rather than to fulfill a recognized, clearly understood corporate objective.

All too often, the edict approach to disaster recovery planning is invoked by irate senior management when one of the following circumstances occurs.

In the first instance, a relatively minor disruption to data center functions — caused by a loss of critical hardware, software failure or both — occurs at the most inopportune time and significantly affects the operation of the corporation. The result may be a loss of data, service, revenue or total processing capability.

In most cases, the duration of the disruption is only significant relative to the effect the disruption has on the corporation's ability to continue normal operations. A disaster does not necessarily entail total absence of function or facility. The point is that the effect of a disaster is directly related to how critical the DP function is to the corporation. However, corporate procedures and politics can distort the possibly minor impact of the disruption out of proportion, ultimately extracting an edict out of harried senior management.

Under the pressure of an edict, the true objectives of disaster recovery planning are lost. The edict typically carries artificially imposed time constraints that severely limit the scope of planning. These constraints, combined with limited available resources, usually result in a "plan" that does nothing more than address the circumstances that led to the edict; this type of plan is merely a set of procedures or guidelines to be used if the same circumstances should reoccur.

The second circumstance that invokes the edict approach is the result of what most MIS/DP managers consider their nemesis — the DP audit. DP managers commonly fail to use the audit process as a useful tool and end up treating it as a necessary, time-consuming evil. When the auditor uncovers a flaw in the MIS/DP function and reports it to senior management, one common result is the corporate edict.

Poor charter

In a third circumstance — which is the exception rather than the rule — the MIS/DP manager, as part of his responsibilities, may be chartered to provide the necessary disaster recovery plan. Unfortunately, this task may be compounded by the imposition of a corporate edict that distorts, places exaggerated importance on and diverts resources from the manager's initially simple task.

As in the previous two situations, the lack of corporate commitment

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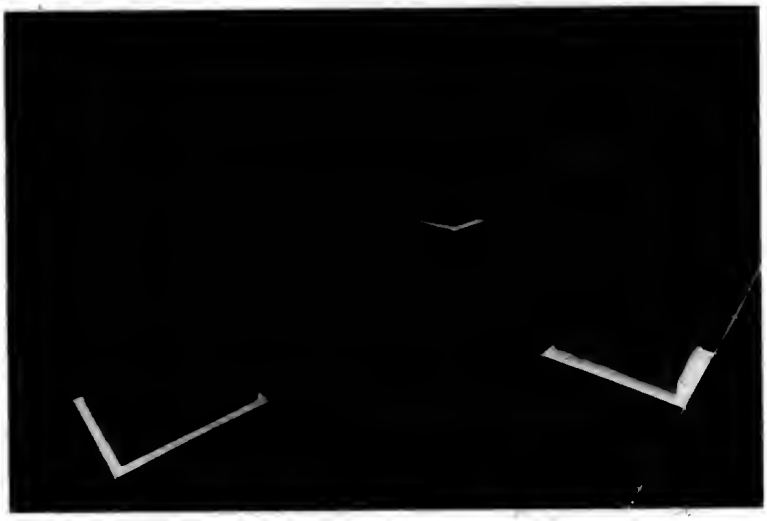

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creates its own set of problems. Unless the corporation's senior managers are formally chartered to provide a similar plan for their individual areas of responsibility and to assist in developing an integrated corporate plan, the MIS/DP manager will continue to be frustrated in meeting his own objectives.

Lack of corporate commitment often results from a lack of understanding at the senior executive level about the impact of the loss of the data center.

This lack of understanding is often supported by a statistical analysis of the potential for such a loss, based solely upon probability factors and actuarial tables. The cost-need analysis often will lead to a false sense of security in senior management and the seemingly appropriate business decision not to back a massive disaster recovery plan.

Put disaster in context

In many instances, MIS/DP managers unwittingly contribute to the misunderstanding and, therefore, the lack of commitment at the senior executive level. While these managers view disaster recovery as a professional responsibility, they are often frustrated in their efforts to provide the corporation with the necessary plans and facilities required to maintain ongoing operational capabilities in the face of a disaster. This situation occurs particularly when this responsibility conflicts with cost-effectiveness.

It is not unusual to find the MIS/DP manager attempting to justify the disaster recovery project in view of the overall MIS/DP mission rather than in view of the business implications of having or not having a plan in place. A thorough business case analysis will provide a much better picture of the impact of a disaster on the corporation's ability to continue operation than will a project plan developed in the context of DP objectives and prioritized along with dozens of other projects.

The justification for a disaster recovery plan must be based upon a sound case that clearly defines the business impact if probability becomes reality. DP/MIS managers must emphasize that a fully functional plan is in reality an expense of doing business and, as such, requires a corporate commitment of resources and funding, not just an increase in the DP budget.

Evolution and integration

Disaster recovery planning is a logical progression of stages designed to ensure the long-term recovery of the data processing function. It is not isolated planning for a worst-case scenario.

The process of evolving a recovery plan should start with defining, designing and implementing a consistent set of guidelines and procedures to be used by data center, programming and user personnel in normal problem resolution. To be effective, these procedures must be integrated into the development of corporate business software applications.

The applications must provide for recoverability based upon the actions to be taken at the data center level. They must incorporate manual or semiautomated functions and procedures that allow end users to continue minimum basic operations in the event of a data center failure.

Where user functions are highly automated, a data center failure all too often causes end users to cease all functions until services are restored. At this point, the MIS/DP function is blamed. After all, "The DP people designed the application, didn't they?" They acquired and ran "the computer that just failed" and "didn't even tell us what to do" if it failed, users say.

Through evolution and integration, the MIS/DP manager avoids many of the pitfalls of the typical DP project approach — including the edict — while providing the same basic capabilities essential to meet the disaster recovery challenge.

Standard operating procedure

Disaster recovery planning can begin at the most elementary level using a process called problem identification, isolation, escalation and resolution (PIIER). The PIIER process provides the basic problem resolution guidelines and procedures necessary to address problems as simple as poorly printed user reports and as complex as the total loss of processing capabilities at the corporate data center. The primary objective of the PIIER process is to establish a standard operating procedure by which

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all data center processing problems are managed and controlled.

The four phases of the PIIER process, if properly defined and implemented, provide the basis for the development of a full-scale disaster recovery plan.

Problem identification. As the foundation for the PIIER process, problem identification must involve all levels of the MIS/DP and end-user staffs, from clerks to managers. All personnel must understand clearly that they share the responsibility for problem identification.

Regardless of the problem's origin (the data center, the end user or management), the fact that the problem exists must be clearly communicated to those affected by it. In this way, those affected ultimately can become part of the solution and not merely an extension of the problem.

> ***In the disaster recovery planning process, problem identification must involve all levels of the MIS/DP and end-user staffs, from clerks to managers. All personnel must understand clearly that they share the responsibility for problem identification.***

Establishing guidelines and procedures for the timely and effective communication of a problem to all affected is critical to the problem's ultimate resolution. These guidelines and procedures must be clear and concise; all MIS/DP and user staff members must be able to access and use them. They should provide a means of directing the problem to the appropriate personnel if further action is required, and their use must be uniform, regardless of the size or significance of the problem.

Isolation. Resolving a problem is often possible using a predetermined decision process. However, a certain percentage of problem situations do not lend themselves to this approach. The cause of these problems is much less obvious and often involves the complex interrelationships between hardware, systems software, data base and data communications software and business applications. In these cases, the cause of the problem must be isolated from these interrelationships.

Problem isolation may be the most difficult part of the PIIER process to manage because of the possibility of finger pointing. Isolating a problem's cause may involve the data center staff, the programming staff and, potentially, the end user.

In order to facilitate isolation and minimize accusations, the data center manager or senior manager is the one who must manage the process, even though the responsibility for resolution ultimately may reside with the applications programming staff or the end users.

Escalation. Problem escalation guidelines and procedures are a key element of the PIIER process. Escalation is the part of the process that establishes the time parameters under which isolation and resolution are accomplished and defines the channels of communication to be used by the problem manager — that is, who should be notified, under what circumstances and when. It is this set of guidelines and procedures that may trigger the ultimate execution of the disaster recovery plan, if necessary.

Escalation procedures must be developed with the cooperation of MIS/DP personnel, end users and corporate management. These procedures clearly define critical decision points and establish the responsibilities for each decision. Otherwise, valuable time and resources may be lost.

Resolution. Problem resolution begins once the cause of the problem is determined or a predetermined decision point is reached in the escalation procedures.

The problem resolution phase of the PIIER process, like the isolation phase, may involve the combined efforts of a number of people. The primary difference between these phases is the makeup of the team. In isolation, the team may be more technically oriented, such as systems programmers or operations technicians, while in resolution, the team may be more applications or business oriented, made up, for example, of production control personnel, programmers or end users.

If problem isolation involves the complex technical environment described above and if clearly defined escalation procedures have been established based upon the problem, ad hoc teams may be formed to assess the problem, determine the cause and plan for resolution. Such teams can include operations personnel, systems or applications programmers and end users.

The recovery plan may be developed by the team as a situation dictates or may be executed as a result of a predetermined decision matrix. These decisions may be as simple as rerunning an application or as complex as executing an off-site recovery plan using one or more predetermined procedures. In either case, the same basic methodology is employed — the standard operating procedure.

Executing the plan

Once the standard operating procedure is in place, the disaster recovery plan is a natural extension of the process. When properly implemented, the PIIER process will have

Continued on page 72

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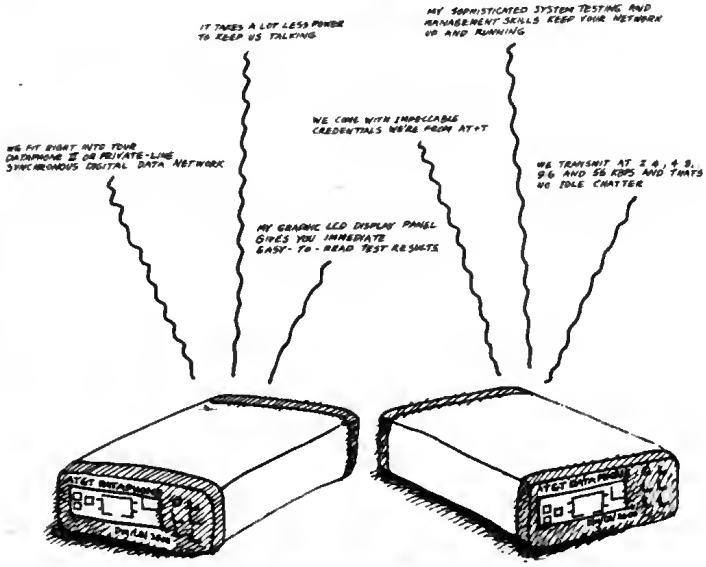

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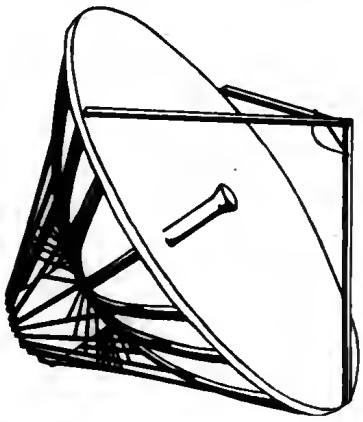

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Guidelines for developing a disaster recovery plan

While developing a disaster recovery plan may never be a turnkey process because of each company's unique requirements, there are some basic guidelines that can be useful.

■ **Gain the corporate commitment** through the evolution of involvement rather than forced involvement.

— Establish a problem identification, isolation, escalation and resolution (PIIER) process within the MIS/DP function.

— Clearly establish problem management accountability.

— Refine the process to use effectively all MIS/DP resources and develop the team concept. Eliminate finger pointing.

— When appropriate, gradually involve the user in the team.

■ **Modify the applications development methodology** to include PIIER principles for recoverability.

— Clearly define recoverability standards.

— Provide semiautomated or manual contingency procedures for critical basic user functions.

— Establish, through PIIER, a decision matrix that will aid both MIS/DP and user personnel in determining when designated contingencies are to be activated. Allow users to take the lead in the decision-making process when appropriate.

■ **Identify critical processing requirements and priorities.**

— Establish definitive categories for all processes, programs, jobs and applications, including those written and controlled by the user.

— Develop a matrix based upon categories, and relate these to recovery phases.

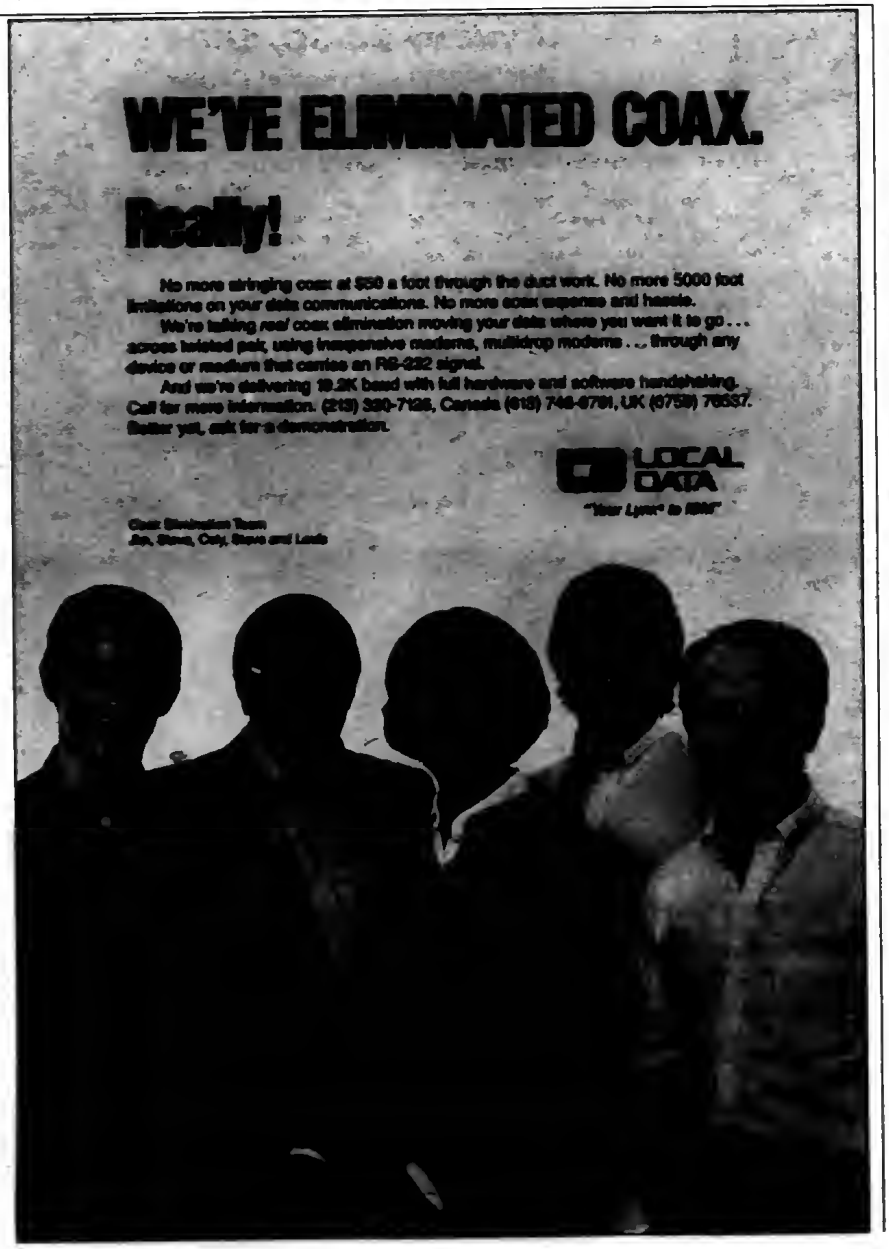
■ **Develop the total recovery plan in phases** based upon the category matrix.

— View each category as an individual phase of the plan.

— Develop contingencies for escalation based on a critical-need matrix and categories using PIIER as the basic methodology.

— Where possible, develop a responsibility matrix for each phase. Keep overlapping of responsibility to a minimum, allowing each team to prepare for potential escalation to their level or phase.

— Develop a plan that will provide for independent testing of each plan phase, then provide for full integrated testing of the total plan.



Continued from page 70

defined clearly all steps in the decision-making process leading up to the execution of the disaster plan.

In most cases, developing the standard operating procedure can be accomplished in a matter of months rather than years and, when properly maintained, can remain as current as the last change made to the system or application programs. Development and implementation can be accomplished with existing staff and with the involvement and commitment of the end users when integrated with the corporate system life cycle development methodology employed by the applications development staff.

Whatever contingency approach — including hot site, cold site or reciprocal agreement — corporate DP chooses for actual disaster recovery, PIIER can form the foundation for its implementation and execution. Developing a plan based upon a combination of these alternatives may not be unrealistic, given the proper indentification and prioritization of critical processing requirements (see story above).

For example, reciprocal agreements may support the most critical processing requirements during the first 24 to 72 hours of an emergency while providing the MIS/DP staff with the time needed to reestablish operation at a hot site or at another facility within the company. Hot-site recovery operations may be feasible for up to a week or 10 days, with functionality being added as critical need increases. At the point where the critical mass grows beyond the limits imposed by the minimum configuration of the hot site, the cold-site option becomes feasible for longer term operations.

When approached in this manner, disaster recovery becomes manageable. If properly organized, the same basic principles of PIIER can be applied through final problem resolution up to and including rebuilding the corporate facility in the event of a total loss.

Disaster recovery planning is seldom successful when taken out of the context of basic functions and services provided by the MIS/DP department in support of the business functions of the corporation. When every problem is addressed as if there were a degree of potential disaster involved and when the same principles of resolution are applied consistently, dealing with any emergency or catastrophe can become standard operating procedure. ■

Contingency planning options protect corporate data assets

By Al Passori

Many data processing professionals and corporate executive officers face difficult business decisions that will affect the cost of providing information processing disaster contingency plans in the future. The time has come for DP managers to take a proactive approach toward managing one of their company's biggest assets — computerized corporate data. Twelve disaster contingency processing options are considered below.

When analyzing this list of options, each company must balance immediate disaster contingency expenses with the strategic planning goals of the company. Many corporate strategy plans may include such considerations as market flexibility, corporate positioning for acquisition or divestiture, real estate investment and certain tax strategies such as investment tax credit or asset depreciation or appreciation.

Due to the inherent difficulty — and in some cases, virtual impossibility — of quantifying financial exposures resulting from a data center disaster, an analysis of the following options should aim at providing a logical business solution that includes estimated costs, quantifiable benefits and the strategic goals of the corporation as well.

■ **Reciprocal agreement.** An agreement between the organization and a local company whereby each company agrees to share the other's DP facility if a disaster occurs.

Strengths. Low cost; immediate availability of equipment if the other company has excess capacity; effectiveness for short-term requirements; and nearby location with minimum travel, lodging and meal expenses incurred.

Shortcomings. Partner in agreement may suffer from effects of same disaster; additional equipment and computer time required to accommodate the partner; each company's hardware and software may not be compatible; difficult to obtain time for testing; and not a long-term solution.

■ **Alternate site reconstruction.** The assumption is that a disaster has totally destroyed a facility housing a DP operation. The contingency plan calls for reconstruction of the existing facility or the construction of a new facility.

Strengths. Long-term availability; one owner.

Shortcomings. Expensive to rebuild and configure; time lost in reconstruction, equipment installation and testing; temporary DP facility needed during reconstruction phase; difficult to test the effectiveness of this option except by simulation of a disaster.

■ **Consortium agreement.** Also called group mutual aid, this option is an expansion of the first reciprocal agreement option. This is an agreement with several member firms that agree to share their DP resources with the member company that suffers from some sort of disaster.

Strengths. Shared costs — pool of members lessens the burden of any one firm having to supply total backup for the affected firm; can be effective for short-term outage; immediately available, depending on agreement.

Shortcomings. Partners may suffer from effects of same disaster; additional computer time must be available from member firms; maintaining hardware and software compatibility among members may be difficult; testing time and resources may be difficult to obtain; more members increase the probability of needing computer time from a member firm's DP facility; member firms may be geographically spread out, thereby increasing transportation costs and inconvenience.

■ **Empty shell.** An empty shell, also called a cold site, is a facility that contains no DP equipment. Except for environmental support such as air conditioners, water conduits, raised floors, motor generators, power outlets and a security system, the facility is just a warehouse that can be made ready for the installation of DP equipment.

Strengths. Low cost, since expenses are shared with multiple owners; immediate availability; long-term availability; nearby location; minimum travel, lodging and meal expenses incurred.

Shortcomings. Partner may suffer from effects of same disaster; once a disaster has been declared, the facility must be equipped, staffed and made operational; may require inordinate lead time to become operational; testing is extremely limited since no hardware is installed; comparatively low return on investment when not in use.

■ **Equipment vendor agreement.** With this option, it may be possible to contract with a vendor to use its corporate facilities, such as a support center, to process the organization's DP work load should a disaster occur. The optimal time to obtain such a written agreement may be

Passori is corporate computer security officer for Amtrak, the National Railroad Passenger Corp. He worked with the Maryland Governor's State Computer Crime Task Force to develop security legislation.

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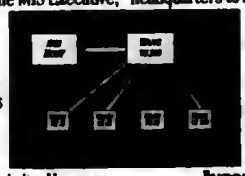

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during the equipment contract negotiations.

Strengths. This option may be cost-justifiable, depending on agreement; long-term availability; vendor knowledge of the organization's needs and configuration.

Shortcomings. Difficult to obtain a satisfactory written agreement; involves transportation and installation costs; difficult to secure test time; lead time required to staff, test and become operational.

■ **Service bureau.** A service bureau is a commercial facility that supplies the necessary resources to process a company's DP work load. Some service bureaus specialize in data entry preparation or time-sharing, while others can provide full DP services from input preparation to delivery of the necessary output products.

Strengths. An expense only when used; immediate availability; long-term availability.

Shortcomings. Expensive for long-term use; high usage fees; may not be available for preferred hours or days because of other customer commitments; lack of security control over bureau; may involve transportation costs; difficult to perform effective testing.

■ **Alternate site — equipped.** This option, also called a hot site, is basically an equipped empty shell approach. In this case, the DP facility is equipped but not staffed.

Strengths. Long-term availability; one owner; immediate availability; easily tested.

Shortcomings. More costly than other options; additional capital expenditure for unused equipment; comparatively low return on investment; some transportation costs.

> ***The time has come for DP managers to take a proactive approach toward managing one of their corporation's biggest assets — computerized corporate data.***

■ **Third-party standby facility.** Another type of hot site, this option consists of a third-party DP facility with short-term (up to six weeks) DP capability. For longer term recovery while the disaster-impacted firm is reconstructing its facility, a hardware-conditioned ready space is available to the customer. The ready space — an empty shell with lights and power installed — allows the customer the continuity of processing for up to six months. To use the ready space, the customer would have to provide its own equipment — usually leased.

Strengths. Immediately available; long-term availability; shared costs; test time available as a part of the contract agreement.

Shortcomings. Available on first-call, first-served basis; high costs — monthly fees and notification of disaster and daily usage fees (current annual cost for service and testing is approximately $80 million); additional costs for on-line backup; hardware and software compatibility must be obtained by an ongoing review of the contract provisions and the organization's requirements; transportation, meals and lodging costs.

■ **Alternate site, co-op ownership.** This option is similar to the alternate equipped site option except that the facility is cooperatively owned by several member firms. In this option, the facility is made ready with the installation of both environmental and DP equipment.

Strengths. Long-term availability; shared costs; immediate availability; reasonable usage costs.

Shortcomings. Available on first-call, first-served basis; maintenance costs could be high; comparatively low return on investment; maintaining hardware and software compatibility is difficult; effective testing is difficult.

■ **Parallel operation.** This option requires total redundancy of the DP system.

Strengths. One hundred percent backup capability; long-term availability; immediate availability.

Shortcomings. Cost may be prohibitive.

■ **Assume all risks via insurance.** This option is self-explanatory — the organization assumes the risks and purchases insurance to cover the loss risks.

Strengths. Minimal capital expenditures.

Shortcomings. The time required to restore DP functions could be inordinate; the firm could lose its competitive edge and customer base; does not meet legal requirements.

■ **Any combination of options.** This allows for a modular approach by selecting the best part of any option based on the organization's disaster contingency requirements. For example, a third-party standby facility may be used to back up batch processing; a service bureau may be used for data entry services; and the consortium agreement may be expanded to back up on-line and limited batch production requirements.

Strengths. May be best approach for the organization; builds on strengths of options; potentially cost-effective; addresses shortcomings; spreads risks over many options.

Shortcomings. Difficult to implement; requires much coordination; may be difficult to test on an integrated basis. ■

A very powerful simple to use file transfer program for the IBM PC, PC3780 allows you to send and receive files between the IBM PC/XT/AT/ Portable or compatible and any other computer supporting any one of the following protocols: 2740, 3740, 3741, 2780, 3780. Using standard IBM hardware, PC3780 gives you fast, easy and error free file transfers.
Compatible with Topview and IBM PC Local Network. WriteMate option to download into Personal Assistant (PFS) file formats: 49 $.

Possible connections
- *PC to PC.*
- *PC to any other computer which has one of the above protocols.*
- *Interface V24 RS232.*
- *By modem: .synchronous; .leased line; .public line; .half duplex; .maximum speed 9600 bauds; .clocks supplied by modem.*
- *Direct line: .maximum speed 9600 bauds; .RX/TX clock must be supplied by the central site.*

Characteristics
User may define: - record size; - number of records per block; - record separator as ITB or IRS; - trailing character suppression such as CR/LF at the end of each record; - end mark of each record; - suppression of unwanted characters in receive; - space compression.

Features
- *Remote start-up possible, automatic restart.*
- *Operations log per file containing number of NAKS, ENQS, blocks sent, records sent and the status of the completed transfer.*
- *Multi-file, maximum block size of 512 bytes, RJE support.*
- *Automatic translation between ASCII and EBCDIC.*
- *Transparent mode (with the option translate into ASCII at arrival). It is possible to transfer binary files, dBase III, etc.*
- *ASCII/EBCDIC/ASCII translation table modification possible.*
- *The PC can be connected as slave or master.*
- *PC3780 can be installed on the hard disk, and run manually or automatically without any operator intervention.*
- *Parameters can be given manually or contained in a command file.*
- *"CALL USING" interface available for local program execution and file dispatching on the fly.*
- *Automatic connection is possible by using modems with an automatic answer.*
- *Can be configured for auto-pilot by the central computer.*

Minimum configuration necessary
An IBM PC/XT/AT/Portable or compatible with at least: - 128 Kbyte memory; - one IBM BSC-ASM card; - one 320 Kbyte diskette unit or a fixed disk.

TDT

EDITIS

TDT Inc., Rivergate Plaza, 444 Brickell Ave. Miami FLA 33131 Tel. (305) 372.93.32.

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NEW PRODUCTS

GTE Telenet announces X.25 Dial

Service allows synchronous network communications

GTE Telenet Communications Corp. of Reston, Va., has launched an X.25 Dial Service for users of personal computers, intelligent terminals and minicomputers.

The GTE Telenet X.25 Dial Service allows users to communicate synchronously over the Telenet public data network by dialing into the network through a modem and telephone.

According to the vendor, the service features end-to-end error detection and correction, transmission speeds up to 4.8K bit/sec. and the ability to perform up to 35 tasks simultaneously. X.25 Dial also supports asynchronous and synchronous IBM applications.

To connect their hosts or data centers to the Telenet network, users need an X.25 communications interface that can be a circuit board for personal computers or an X.25 modem and software appropriate for their specific application. To access the network, the end user dials the nearest X.25 Dial Telenet network node. Once the connection is established, data can be sent over the local-access link to Telenet.

The X.25 Dial Service allows transmission of data directly from a single terminal or from a large cluster of terminals attached to a terminal concentrator supporting X.25.

Public access for X.25 Dial at 1,200 and 2,400 bit/sec. is offered initially in 20 cities across the country.

Private Dial Access, for users desiring access ports dedicated to their user community, is available in all existing Telenet synchronous cities at 1,200, 2,400 and 4.8K bit/sec.

X.25 Dial Service costs 32 cents for the first two minutes and 11.4 cents for each additional minute.

Honeywell adds micros

IBM-compatible series out for business applications

Honeywell, Inc.'s Small Computer and Office Systems Group of Billerica, Mass., has added the EP Series of IBM-compatible personal computers to its family of micros.

The EP Series was designed for business use. It is offered in three basic models: a single 360K-byte diskette; a dual 360K-byte diskette; and a single, 360K-byte diskette with a 10M-byte, half-height hard disk.

All three of the models are said to include a dual-speed Intel Corp. 80882 microprocessor that runs at selectable speeds of 4.77 or 8 MHz; 256K bytes of main memory, expandable to 640K bytes on the system unit board; integrated parallel printer port and high-resolution monochrome monitor port with Hercules Computer Technology Co. graphics emulation; four full-length expansion slots; Microsoft Corp. MS-DOS 2.1 and GW Basic; Honeywell Menu Manager; and diskette-based tutorials, related manuals and diagnostics.

According to a company spokesman, all EP Series models can run Honeywell's micro System VIP Emulation software and can accept the company's multifunction communications adapter. These products allow an EP Series model to appear as a Honeywell synchronous or asynchronous VIP data terminal when connected to a Honeywell host system.

One model of Honeywell's EP Series of personal computers

EP Series shipments will begin in February. Starting prices are as follows: single-diskette model, $1,450; dual-diskette model $1,550; and single-diskette model with a 10M-byte hard disk, $2,650.

The EP Series uses the Honeywell Microswitch 83-key keyboard and a range of monitors and printers. Keyboard, monitors and printers are priced separately.

Oracle ports DBMS to Vaxcluster

Oracle Corp. of Menlo Park, Calif., has ported its Oracle relational data base management system to Digital Equipment Corp. Vaxcluster configurations.

According to a company spokesman, Vaxcluster Oracle allows all users within a Vaxcluster to share data bases using an SQL-compatible, mainframe-class relational system and fourth-generation application tools.

The vendor claims that Oracle allows portability of applications and data between Vaxcluster systems and the corporate data center. Portability extends upward to Oracle or IBM's DB2 and SQL/DS data base management systems running on mainframes as well as personal computers running Oracle.

Applications operate identically, whether in clustered on nonclustered mode, and any program written for any version of Oracle will run without modification on the Vaxcluster.

VMS Version 4.1 or greater is required. The initial license fee on VAX systems ranges from $24,000 up to $96,000. Subsequent licenses are available for 50% of the initial license fee.

INSIDE

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Atari showcases personal computer, 20M-byte hard-disk peripheral unit

Atari Corp. of Sunnyvale, Calif., has introduced the 1040ST personal computer with 1M byte of memory.

The 1040ST is intended as a business system. It features a professional integrated design including built-in CPU, keyboard and disk drive. It comes complete with ST Basic, 1st Word word processing software, Neochrome paint program and a Digital Equipment Corp. VT52 terminal emulator for telecommunications applications.

Features of the 1040ST include its built-in, double-sided, double-density 3½-in. disk drive and power supply and a 95-key keyboard with a separate cursor, 10 function keys and an 18-key numeric keypad.

The computer has a direct memory access hard-disk port as well as a floppy-disk interface for an external 3½-in. drive. It also has a built-in RS-232 serial port, an industry-standard parallel printer port, a graphics interface using the Digital Research, Inc. Graphics Environment Manager standard and a mouse controller.

Software programs developed for the Atari 520ST are said to be completely compatible with the 1040ST.

In a related announcement, Atari also introduced a 20M-byte, 5¼-in. hard-disk peripheral called the SHD-204. It is priced at $799.95.

The 1040ST system is available with a high-resolution, 640- by 400-pixel monochrome monitor for $999.95 or with a medium-resolution, 640- by 200-pixel color monitor for $1,199.95. There is a palette of 512 colors available, and radio frequency (RF) video output is provided by a built-in RF modulator.

Teleray's Model 20-7813 terminal emulates Honeywell VIP models

Teleray, Inc. of Minneapolis has announced the Model 20-7813, a terminal designed to emulate Honeywell, Inc.'s VIP 7813, 7823 and 7305 terminals in separate menu-selectable operating modes.

The Model 20-7813 is said to feature an ANSI-based Digital Equipment Corp. VT100-compatible mode and offers the user a choice of 80- or 132-col. display formats in all modes.

Its keyboard layout is the same as that of the Honeywell terminal, and, according to the vendor, it uses the same application-specific overlays as well as an ANSI X3.64 overlay.

The terminal has 1,080 characters of nonvolatile memory reserved for use in up to 16 user-programmable functions, Teleray said. Its display format is 24 lines. However, with its 5,760-char. display memory, the format can be changed from the keyboard to be up to 7 lines of 80 columns or 43 lines of 132 columns.

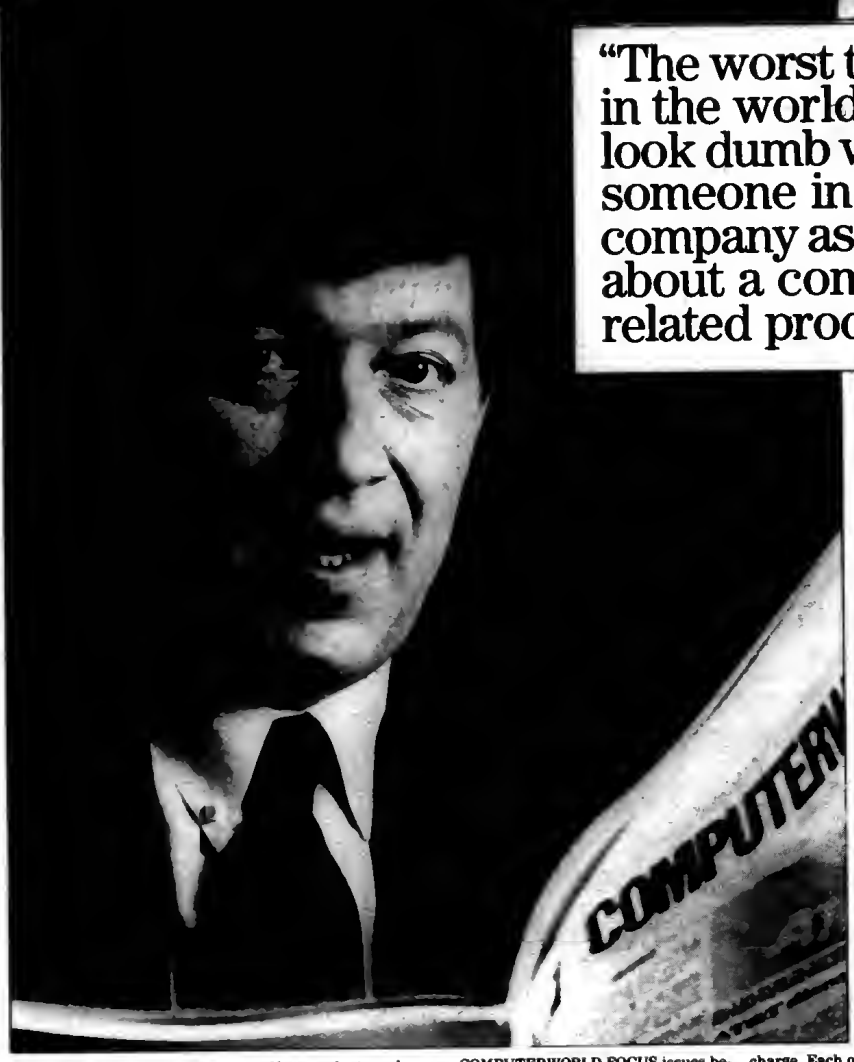
Any unused portion of the memory is automatically reserved for use in a second group of 16 volatile programmable functions, the vendor reported.

The 20-7813 contains both RS-232C and RS-422A interfaces. It also has a second bidirectional port that can be used to interface either a printer or an alternate host, and it supports an optional capability for running Tektronix, Inc. 4010- and 4014-compatible graphics.

The Model 20-7813 features a 14-in. green or amber CRT screen in Teleray's tilt-and-swivel Triumph enclosure.

Teleray said that the product is priced at $1,595.

"The worst thing in the world is to look dumb when someone in your company asks you about a computer related product..."



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NEW PRODUCTS/SOFTWARE & SERVICES

SOFTWARE & SERVICES

Systems software

VM Systems Group, Inc. has announced a release of **V/Spell**, the interactive, comprehensive dictionary spelling checker for the VM operating system for IBM mainframes.

The release offers simplified installation and easy customization of PF keys. V/Spell may now be invoked from an XEDIT macro.

V/Spell is available for all VM/SP releases. It is licensed starting at $2,715 for a one-year lease for one processor.

VM Systems Group, Suite 515, 2300 S. 9th St., Arlington, Va. 22204.

■

B. I. Moyle Associates, Inc. has announced **BIM-FMAP**, a program that is said to simplify the development, maintenance and control of IBM CICS basic mapping support maps for IBM DOS and OS users.

BIM-FMAP allows the user to paint the desired screen image directly on the terminal, providing an immediate view of the map to be displayed and eliminating the coding cycle.

BIM-FMAP for DOS/VSE is priced at $2,000 for a permanent license or $1,000 per year or $100 per month. For OS/VSI or OS/MVS, the prices are $3,000 for a permanent license, $1,500 per year and $150 per month.

B. I. Moyle Associates, 5788 Lincoln Drive, Minneapolis, Minn. 55436.

■

Carleton Corp. has announced the 1985 release of the **CMS version of CQS-Infotec and CQS-Auditec.**

The products are dictionary-based information retrieval and report writing packages. CQS-Auditec is designed for auditors and CQS-Infotec is designed for a range of users with varying DP experience.

The latest release builds MVS job control language for CQS processing jobs.

The CMS version of CQS-Auditec is priced at $27,500, and CQS-Infotec is priced at $33,000.

Carleton, 245 First St., Cambridge, Mass. 02142.

■

Aim Technology Co. has announced the **Aim Disk Tuner**, a software package designed to increase disk efficiency in Unix systems.

The Aim Disk Tuner utilizes statistics on file use frequency to localize disk arm movement and free space placement.

The file layout strategies developed and implemented by the disk tuner are based on an algorithm that trims and reorders directories and repacks the most used files near the head of the file system.

The Aim Disk Tuner runs on AT&T Unix System V, System III, Version 7 and Microsoft Corp. Xenix. It is priced at $6,000.

Aim Technology, Suite 390, 4655 Old Ironsides Drive, Santa Clara, Calif. 95054.

■

Software Express, Inc. has enhanced its **Appgen** development and applications software line.

Version 1.5.3 includes a master menu builder and improved data management. The master menu builder links all Appgen-created applications together through one master menu. Improved data management is achieved through an internal virtual storage manager.

Upgrades to Version 1.5.3 cost $100 per application and $250 per Appgen development. Version 1.5.3 runs on Unix and Microsoft Corp. Xenix-based machines. Appgen Development is priced at $6,000; most applications are priced at $600 each.

Software Express, 7th Floor, 2925 Briarpark Drive, Houston, Texas 77042.

Maersk Data (USA), Inc. has announced **MD-Spool**, an on-line system for operating and controlling IBM's printing facility for IBM's Graphical Data Display Manager graphics.

MD-Spool allows printers, plotters or any graphics device to be added to the spooling system without interruption of the existing queue. It has security measures that ensure that users can handle their printing inquiries.

The system operates in the TSO/ISPF environment and works with IBM ADMprint and DSprint queues.

MD-Spool is priced at $5,000. An introductory license fee is available until April for $4,000.

Maersk Data, Suite 3527, One World Trade Center, New York, N.Y. 10048.

■

Penta-Group, Inc. has announced **Pensaf**, a modularized security system for Digital Equipment Corp. PDP and VAX computer systems.

Pensaf is a function-level security system designed to protect menus, programs and data files from unauthorized use. It checks user names, passwords and access restrictions; has various logging capabilities; and provides on-line edits and Helps.

Continued on page 78

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NEW PRODUCTS/SOFTWARE & SERVICES

Continued from page 77

All Pensaf data has been encoded.

The software is available for systems operating under DEC's RSTS/E, RSX-11M+ and VMS. The package is priced at $950.

Penta-Group, 1187 Main Ave., Clifton, N.J. 07011.

■

Outlook Software, Inc. has announced **E-Mail/38**, an electronic mail system designed for the IBM System/38.

E-Mail/38 allows all System/38 users to create and distribute letters or documents automatically to any user with access to a System/38 terminal, local or remote.

Security is provided via either the System/38 user profiles or E-Mail/38 passwords.

E-Mail/38 is priced at $1,250.

Outlook Software, Suite 117, 1 Woodfield Lake, Schaumburg, Ill. 60195.

■

Software Maintenance and Development Systems, Inc. has ported its **Aide-De-Camp** software management system to Prime Computer, Inc. Prime 50 series machines.

The software is said to be a comprehensive software change control system. Information on software entities, changes, versions, external documentation and internal structural relationships are reportedly captured and maintained inside the data base.

Aide-De-Camp system binary licenses are priced at $8,000 for Prime office-size systems and at $14,500 for computer room systems, according to the vendor.

Software Maintenance and Development Systems, P.O. Box 555, Concord, Mass. 01742.

Productivity aids

ADP Network Services has released **Referee**, a software utility program that acts as a class-based scheduler for Digital Equipment Corp. VAX systems running VMS.

Referee identifies users, groups them into allocation classes and then limits those classes to a given percentage of available CPUs. Referee also maintains statistics and provides reports on CPU usage.

The Referee software utility program costs $4,990.

ADP Network Services, 175 Jackson Place, Ann Arbor, Mich. 48103.

Business Software Technology, Inc. has added the **Online Monitoring and Analysis Component** to its Run Time Evaluator (RTE) software for performance analysis of applications running under Cullinet Software, Inc.'s IDMS and IDMS/R.

The Online Monitor provides online access to statistical information associated with the execution of all IDMS applications.

The component will be provided at no cost to all existing RTE users. The current site license fee for RTE is $19,500.

Business Software Technology, 950 N. Main St., Randolph, Mass. 02368.

■

Lemcomm Softgram has announced **Compleximeter**, an automatic metric tool for measuring software structural complexity.

Compleximeter is said to standardize software structural complexity. It is divided into four parts: structural analysis of a system's nesting and twinning of components, computations of structural complexity, analysis of multiplicity of parent nodes and a diagram of the system's hierarchical tree structure.

It costs $750.

Lemcomm Softgram, 2621 N. Emmett St., Chicago, Ill. 60647.

■

Cipherlink Corp. has announced **Any/QA**, a utility designed to automate software testing.

Any/QA is said to eliminate repetitive, manual rekeying of test data; install without computer modification; and generate audit trails to simplify the preparation of documentation.

The software resides on a Compaq Computer Corp. Compaq Plus or an IBM Personal Computer AT. The Cipherlink Any data bridge is connected through a port to the computer running the software to be tested.

Any/QA is priced at $600 per month for a three-year lease.

Cipherlink, 3807 Wilshire Blvd., Los Angeles, Calif. 90010.

■

Retrieval Technology Corp. has announced **Transactor**, a software utility that runs under Software House, Inc.'s System 1032 data base management system on Digital Equipment Corp. VAX computers.

The Transactor is forms driven. It is said to perform large-scale updates, changes and deletions to a 1032 data base. It allows for changes using all mathematical functions, string concatenation, user-defined formulas and user-written procedures.

The product costs $2,000 per CPU.

Retrival Technology, 3 Courthouse Lane, Chelmsford, Mass. 01824.

■

Comsoft International has announced **Release 3** of its **CSI-MAPR** interactive screen code generator for IBM and plug-compatible mainframes running IBM CICS in a DOS or MVS operating system.

CSI-MAPR generates the basic mapping support source code and the copybook for the application program's terminal I/O area. Data names can be up to 30 characters in length.

Continued on page 79

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Continued from page 78

CSI-MAPR is priced at $1,595, including one year of maintenance. The subsequent yearly maintenance fee is $195.

Comsoft International, Suite 38A, 8280 Janes Ave., Woodridge, Ill. 60517.

■

GMD Systems International, Inc. has announced **MAPICS Summarized Journal Entry**, a software product designed for Manufacturing Accounting and Production Information Control System (MAPICS) users on the IBM System/34 and System/36.

The product is said to simplify the monthly closing process. It summarizes selected subsidiary ledgers and passes only the summary entries to the general ledger.

The MAPICS system costs $1,200.

GMD Systems, 8601 Dunwoody Place, Atlanta, Ga. 30338.

■

Carr Lane Manufacturing Co. is offering its **tooling component symbol library** for the Versacad computer-aided design software from T&W Systems, Inc.

The library contains 6,000 drawings representing about 5,100 individual jig and fixture components including pins, clamps, rests, bases, positioners, handles, knobs and bushings. Each component is represented in full scale and in full detail, with all components individually drawn instead of being read optically.

By integrating the library into Versacad, parts can be integrated into other computer-aided designs for manipulation and modification.

The library costs $1,495.

T&W Systems, Suite 106, 7372 Prince Drive, Huntington Beach, Calif. 92647.

Application packages

Interchart Software, Inc. has introduced **Chartbuster**, a software package that allows users to create charts and tables from the same data for processing by Issco's Tell-A-Graf system.

Chartbuster can format supporting text slides to complement the charts and tables produced. Users can select graph types, line types, colors and fonts through Chartbuster's Help displays as well as build and store their own command files.

Chartbuster is written in Fortran and operates on mainframes currently supporting Tell-A-Graf, including IBM's MVS/TSO and VM/CMS and Digital Equipment Corp.'s Tops 10, Tops 20 and VAX VMS. A single CPU perpetual license costs $18,000 per year. Rental is offered at $750 per month.

Interchart Software, 104 Carnegie Center, Princeton, N.J. 08540.

■

Help/38 Systems, Inc. has announced **Menu Maker**, a software package designed to allow users of the IBM System/38 to set up on-line environments and jobs with no Command language programming or coding.

Menus can be created while others are on the system.

Menu Maker also contains modules for Help text entry and display, a library list facility and user profiles. It also integrates with the vendor's Robot/38 automatic job scheduler to give programmers control over their on-line and batch systems.

The Menu Maker software package is priced at $1,595 per CPU.

Help/38, 210 Baker Technology Plaza, 6101 Baker Road, Minnetonka, Minn. 55345.

American Channels, Inc. has announced **AC/Solids**, a three-dimensional solids modeler for computer-aided design applications.

AC/Solids integrates with surface modeling, two-dimensional CAD and numerical control parts programming.

AC/Solids runs on the Digital Equipment Corp. VAX/Microvax and Apollo Computer, Inc.'s Domain computer systems. The license price is $9,000 per single user and $18,000 per DEC VAX/Microvax system of four Apollo nodes.

American Channels, 1050 Waltham St., Lexington, Mass. 02173.

■

MCBA, Inc. has announced **Release 3** of its **Accounts Receivable** and **General Ledger** packages in Cobol for Texas Instruments, Inc.'s Business Systems.

Continued on page 82

Looking for an information center system that handles just about anything they throw at you?

Trying to juggle end user demands without losing control?

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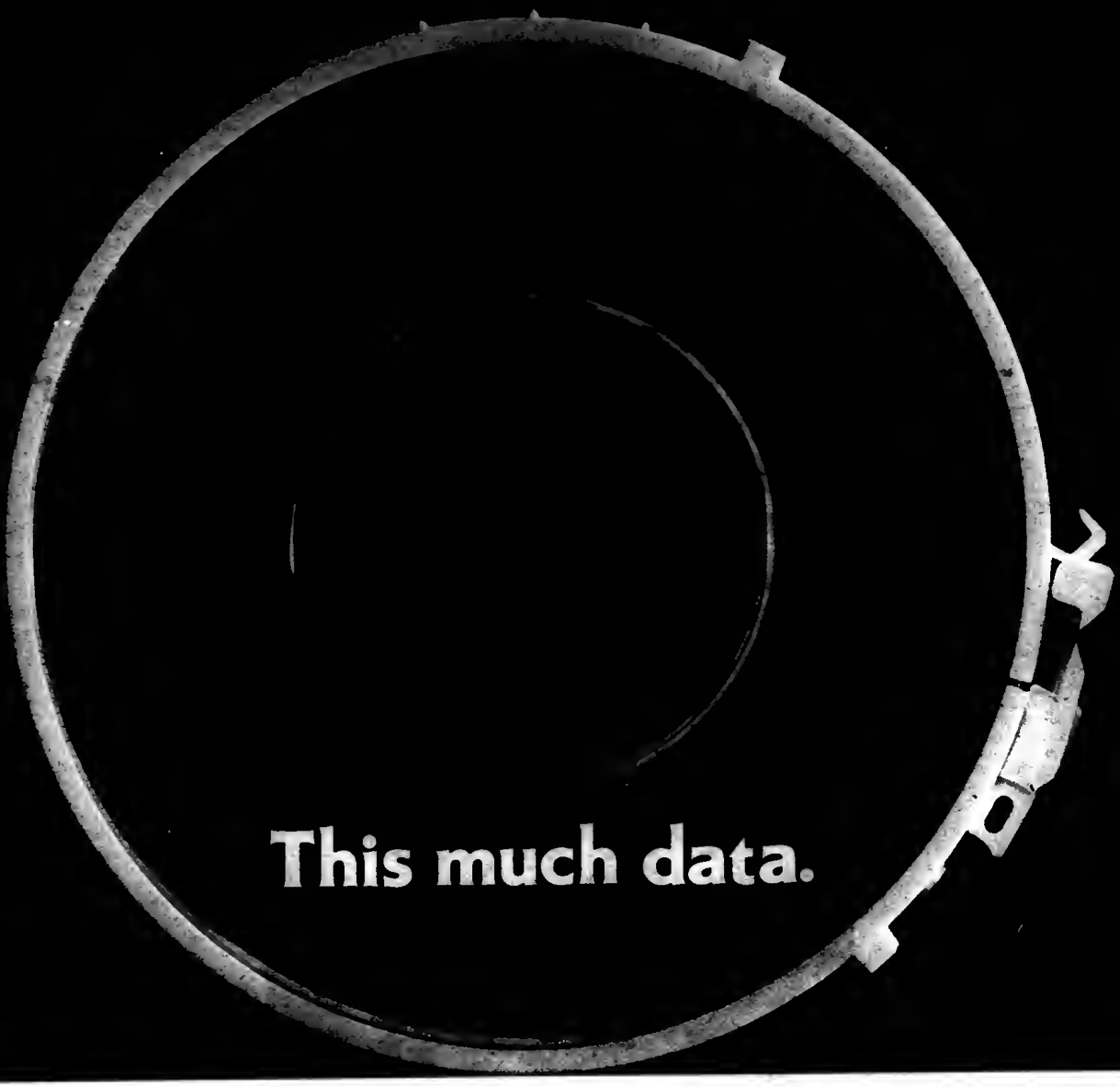

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This compact cartridge* is a major innovation in computer tape technology. It holds 20% more data than a standard 10½" reel.** Yet it takes only one-fourth the storage space.

A key reason for this increase in storage capacity is the chromium dioxide magnetic crystal.

Thanks to Du Pont chromium dioxide, the 18-track tape has a recording density of about 38,000 bytes per inch—six times higher than the current industry standard. This higher density makes it possible to pack more than a reel of data into the compact 4" × 5" cartridge you see above.

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*ANSI proposal X3B5-182.
**ANSI X3.40-1983.

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NEW PRODUCTS/SOFTWARE & SERVICES

Continued from page 79

The packages run under TI's DX10 operating system. Major enhancements include an optional security system, passwords that may be shared by a class of users, user-defined function keys and the ability to store programs and data on any disk/directory.

The packages are priced from $2,000 to $3,000, depending on the package selected and the hardware configuration.

MCBA, 2441 Honolulu Ave., Montrose, Calif. 91020.

■

Control Data Corp. has ported MacNeal-Schwendler Corp.'s computer-aided engineering software application **MSC/Nastran** for its Cyber 180 computer systems to its NOS/VE operating system.

MSC/Nastran is a version of the National Aeronautics and Space Administration Structural Analysis Program that has been available to Cyber users under the NOS and NOS/VE operating systems. It is a structural analysis program designed to determine strength, safety and performance characteristics of structures and products.

MSC/Nastran is leased for $1,500 per month for the Cyber 180 Model 810 and on a usage basis for all other models.

CDC, 8100 34th Ave S., Minneapolis, Minn. 55440.

On-line data bases

Multiplications Software, Inc. has announced **Imagine 2**, an enhanced version of its on-line query and reporting system.

Imagine 2 allows users to access directly variable-length data records with "occurs depending on" data structures, to access directly hierarchical data structures with one-to-many hierarchical relationships, to generate a new VSAM output file that can be postprocessed by Imagine or downloaded to a personal computer and to generate multiple reports from a single pass of the data base.

Imagine 2 is available in IBM DOS/VSE, OS/VS1 and OS/MVS versions, executing on CICS Release 1.4 or higher. Perpetual licenses range from $45,000 for DOS/VSE to $59,500 for MVS.

Multiplications Software, 50 Church St., Cambridge, Mass. 02138.

Training

Alden Yankee Computers, Inc. has announced an **automated training course** for people wanting to learn the Unix operating system.

The course provides users with hands-on computer-aided instruction covering topics from basic file handling to programming in C.

Service is available via telephone lines 24 hours per day, seven days a week. Alden Yankee will also provide help to users who have questions or need assistance.

User rates are $15 per hour at 300 or 1,200 bit/sec.

Alden Yankee Computers, Suite 3, 41 Columbian St., Weymouth, Mass. 02190

■

Retrieval Technology Corp. has announced the **All-Hands-On C Video Workshop**, a video-based computer training package.

The workshop includes six modules designed to teach programmers the features and capabilities of the C language. The modules are Introduction and Tutorial; Operators and Expressions; Arrays, Strings and I/O; Statement and Control Flow; Functions and Variables; and Pointers and Structures.

The Workshop is available in all video formats and costs $995.

Retrieval Technology, 3 Courthouse Lane, Chelmsford, Mass. 01824.

■

Computer Systems Research, Inc. has announced **JES2 Environment and Operational Control**, a computer-aided instruction package designed to teach the concepts, functions and use of IBM's JES2 operating system.

The courseware can be used on either an IBM Personal Computer, mainframe or compatible. The package simulates an MVS/JES2 environment providing the student with hands-on experience. Each module provides reviewing, prompting, testing and practicing.

The CSR Trainer 4000 system is required to run the course on the IBM Personal Computer. On a mainframe, IBM's Interactive Instructional Presentation system or Goal Systems International, Inc.'s Phoenix system is required.

The course costs $7,200.

Computer Systems Research, P.O. Box 45, Avon Park S., Avon, Conn. 06001.

■

Massoglia and Associates, Inc. has announced a **group of publications** providing tips, techniques and training in the use of IBM System/36 and System/38.

The publications for the System/36 are *Everything You Always Wanted to Know about the System/36 but were Afraid to Ask* and *Writing and Using System/36 Procedures Effectively*.

Publications for the System/38 include *System/38 for Beginners*, *System Subfiles Made Easy*, *Using the Power of Conversion Reformat on the System/38* and *Getting Started with System/38 Edit Text*.

A single publication costs $65.

Massoglia and Associates, Suite 102, 4970 Northwind Drive, East Lansing, Mich. 48823.

■

Goal Systems International, Inc. has introduced **ADR Email**, a computer-based training course designed to introduce students to Applied Data Research, Inc.'s Email electronic mail system.

The course simulates system operation. It requires either Goal's Phoenix system, the Phoenix/Presentation system or the Phoenix/Deltak system.

The course, including software, instructor's manual and student manual, costs $4,200.

Goal Systems, 5455 N. High St., Columbus, Ohio 43214.

■

IM-Press has announced **Digital Trainer-1**, a software program that teaches the user about the digital devices on an IBM Personal Computer.

Digital Trainer-1 provides information about the And, Or, Inverter, Nand, Nor, Exclusive Or, Not, Flip-Flops, Latches, Counters and Registers devices. The program is said to teach users how to define new logic devices with which to experiment.

Digital Trainer-1 costs $10. A registration fee of $50 includes training materials and access to future releases.

IM-Press, 1412 Rosewood, Ann Arbor, Mich. 48104.

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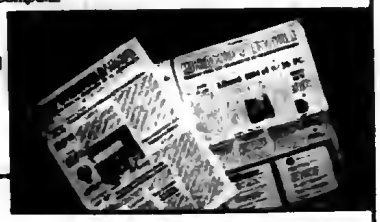

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NEW PRODUCTS/MICROCOMPUTERS

MICROCOMPUTERS

Software

Rising Star Industries has released **Valdocs+**, the newest version of its integrated software package.

Enhancements were made in the word processing and spreadsheet modules and in passing data between modules.

Valdocs+ runs on the Epson America, Inc. QX-10 and QX-16 personal computers. It costs $349 without a mouse and $449 with a mouse.

Rising Star Industries, Suite 2000, 25500 Hawthorne Blvd., Torrance, Calif. 90505.

■

DBI Software Products Co. has announced that its **Trajectories** statistical processing system is now available for BTOS and Microsoft Corp. Xenix operating systems.

Trajectories offers over 120 different statistical functions as well as a two-way interface to mainframes.

A single-user system is priced at $395.

DBI Software Products, Suite 100, 206 W. Michigan, Mount Pleasant, Mich. 48858.

■

Keller Software has announced **Laser Fonts**, a print utility for the Hewlett-Packard Co. Laserjet printer.

Laser Fonts is memory resident and prints up to 233 font styles by embedding codes into documents. Font cartridges A through V are supported.

Laser Fonts costs $39.

Keller Software, 1825 Westcliff Drive, Newport Beach, Calif. 92660.

■

Brainstorm Development, Inc. has announced **Overture**, a financial software product for the Apple Computer, Inc. Macintosh.

Overture performs discounted cash-flow analysis and calculates loans and depreciation. It also has the ability to create amortization schedules.

It costs $99.95.

Brainstorm Development, Suite 170, 9500 Jollyville Road, Austin, Texas 78759.

■

Interface Technologies Corp. has introduced **Release 3** of its **Modula-2 Software Development System** (M2SDS) as well as **M2Debug**, a symbolic runtime debugger program.

Release 3 features an implementation of a Virtual Memory Management System said to boost the compile speed for M2SDS by 50%.

M2SDS includes an incremental compiler, 21 library modules and multiple window-editing capabilities.

M2SDS Release 3 costs $80.88. M2Debug costs $79.

Interface Technologies, Suite 200, 3336 Richmond Ave., Houston, Texas 77098.

■

Micromotion has announced the **Masterforth Target Application Generation System** (TAGS) for Apple Computer, Inc. Macintosh and IBM Personal Computer developers.

TAGS is said to enable users to produce applications programs for virtually any programming environment. It includes the Masterforth development system, the random-access memory and read-only memory dictionary source files.

TAGS is priced at $495.

Micromotion, #A171, 8726 S. Sepulveda Blvd., Los Angeles, Calif. 90045.

■

Dogwood Software has announced **Helping Hand**, a concurrent productivity aid and reference utility for the IBM Personal Computer, Personal Computer XT, AT and Type I compatibles.

The program runs in a windowing

Continued on page 84

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NEW PRODUCTS/MICROCOMPUTERS

Continued from page 83

environment, allowing users to access a variety of on-line reference files.

Helping Hand requires Microsoft Corp. MS-DOS 1 or higher, 33K bytes of random-access memory and one floppy disk drive.

It costs $29.95 for the system and $59.95 for the programmers kit.

Dogwood Software, Suite 510, 1800 Peachtree St., Atlanta, Ga. 30309.

■

Software Channels, Inc. has announced **Alice: The Personal Pascal** for the IBM Personal Computer and compatibles.

Alice is a Pascal programming environment based on a syntax-directed editor. Alice provides a menu of templates that the programmer can choose from to build and edit programs. It contains a Pascal interpreter that includes program debugging tools.

The product costs $95.

Software Channels, Four Kingwood Place, Kingwood, Texas 77339.

Communications

Syntax has extended its VAX Interface Manager (VIM) local-area network product family to include **Vaxserver, VIM Filetransfer, VIM Virtualterminal and Rainbowlink.**

Vaxserver provides Microsoft Corp. MS-DOS file, print and electronic mail services for micros on the Digital Equipment Corp. VAX.

VIM Filetransfer supports bidirectional file transfer initiated on the micro to computers on a DEC Decnet network. VIM Virtualterminal emulation software lets a micro function like a DEC VT100 terminal.

Rainbowlink enables DEC Rainbow personal computers to participate in the VIM local-area network.

Prices for Vaxserver on the VAX-11/700, DEC VAX 8600, the DEC Microvax I and Microvax II are $7,500, $2,500 and $5,000, respectively; $2,500 for VIM Filetransfer; $2,500 for VIM Virtualterminal; and $995 for Rainbowlink.

Syntax, Suite N107, 6642 S. 193rd Place, Kent, Wash. 98032.

■

Dialogic Corp. has announced the **Dialog/40 System**, designed to provide the IBM Personal Computer, Personal Computer XT, AT and compatibles with real-time digitizing, voice I/O as well as telephone management over a telephone network.

A single Dialog/40 System is said to support the interface and servicing of four telephone lines concurrently.

The Dialog/40 is priced at $995.

Dialogic, 60 Baldwin Road, Parsippany, N.J. 07054.

■

Carterfone Communications Corp. has enhanced its **PC/Reach** software, providing IBM Personal Computer support to its **Adcomm 96/48** family of asynchronous modem and multiplexer products.

The software is said to give Personal Computer users long-haul dial-up communications at data rates up to 19.2K bit/sec.

Carterfone is bundling the software with both its Adcomm-1 and Adcomm-2 products, with combined hardware and software prices ranging from $2,095 to $2,595.

Carterfone Communications, Suite 1100 W., 1341 W. Mockingbird Lane, Dallas, Texas 75247.

■

Novell, Inc. has announced the **Intelligent Network Interface Card** (NIC) for its Netware/S-Net local-area network.

The card is designed to facilitate communication in network gateways, bridges and workstations. It is intended as an optional replacement for the current IBM NIC in network workstations, but it is required in each network gateway. It features a built-in communications processor

Advanced Netware 1.02 or higher is required for use with the Intelligent NIC. The Intelligent NIC is priced at $395.

Novell, 748 N. 1340 W., Orem, Utah 84057.

■

Software Ventures Corp. has announced **Microphone**, a telecommunications software program designed for the Apple Computer, Inc. Macintosh.

Microphone is said to use macros to automate the telecommunications process. The program offers a complete file transfer capability, allowing users to send and receive spreadsheets, charts and artwork that can be created on a Macintosh.

Microphone emulates Digital Equipment Corp. VT100- and VT52-type terminals and supports ASCII text and Xmodem protocols.

The package costs $74.95.

Software Ventures, Suite 220, 2907 Claremont Ave., Berkeley, Calif. 94705.

Storage

Unbound, Inc. has announced the **MVED series** Winchester disk subsystem designed to increase the capacity of the Digital Equipment Corp. Microvax II.

The series allows field upgrading of the BA123 Business Box Microvax II to its fullest complement of three 5¼-in. disk drives, according to the vendor.

The package includes a Mass Storage Control Protocol-compatible disk controller, one or two 5¼-in. disk drives, drive mounting plates, cables, activity panels and diagnostics and formatting programs.

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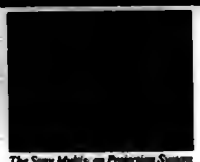
The fixed frequency of all other projection systems relegates your data to limbo from frame to frame.



The Sony Multiscan Projection System with the auto-lock frequency system ensures letter-perfect transmissions.

Ever get the feeling that the video projector is undermining your corporate image? That projecting computer data is constantly subject to the whims of chance? And impossible to achieve without the aid of technical assistance? Well, join the crowd.

The fact is, this last and most critical link in the video presentation chain has been suffering from benign neglect—until now.

Sony has just devised a Multiscan video projector that will let you project computer data without the aid of any technical assistance or adjustments.

The key to this unit is a unique auto-lock feature which automatically senses where on the horizontal and vertical frequencies the computer signal is, and then locks in on it. And it interfaces perfectly with 80% of the computers on the market today. Including micros through mainframes. And it's plug-compatible with a 25-pin analog/digital connector and a 9-pin IBM-compatible connector.

NEW PRODUCTS/MICROCOMPUTERS

Pricing for the series ranges from $7,200 for one 123M-byte drive to $12,500 for two 165M-byte drives and controller.

Unbound, 15239 Springdale St., Huntington Beach, Calif. 92649.

■

CMS, Inc. has introduced the **CMS Drive Plus** family of 20M-byte, 3½-in. hard disk drives on add-in cards for the IBM Personal Computer XT and compatibles.

The family consists of three models that fit in full-size slots. The first is a small computer systems interface (SCSI) version; the other two are compatible with the ST-506 disk drive interface, one with a ruggedized drive with head lifters and the other with a standard 3½-in. drive.

The SCSI version costs $745; the ST-506 with head lifters costs $695, and the standard ST-506 costs $595.

CMS, 401-B W. Dyer Road, Santa Ana, Calif. 92707.

■

Techtran Industries, Inc. has introduced the **757 Bytebank**, a solid-state data storage and retrieval unit.

The 757 is a microprocessor-based unit with storage capacities ranging from 256K bytes to 1.536M bytes of dynamic random-access memory. Connections to a user system or computer are made via two independent RS-232C serial interfaces operating at 110 bit/sec. to 9.6K bit/sec.

Operation can be programmed by the user.

Prices start at $995.

Techtran Industries, 200 Commerce Drive, Rochester, N.Y. 14623.

Emerald Systems Corp. has announced the **Model MTM 80-8000**, a manual-loading, ¼-in., 9-track tape drive, IBM Personal Computer AT subsystem.

The subsystem allows users to read and write ANSI-standard 9-track tapes at 1,600 or 3.2K bit/in. At 1,600 bit/in. the tape transport operates at 50 in./sec. The transport can accommodate 7-, 8½- or 10½-in. reels.

The formatted capacity of a 10½-in. reel is 83M bytes.

The subsystem comes bundled with three Emerald software utilities for micro-to-mainframe communications, hard-disk backup and tape drive diagnostics.

The MTM 80-8000 is priced at $4,950, the vendor said.

Emerald Systems, 4757 Morena Blvd., San Diego, Calif. 92117.

Printers/plotters/peripherals

Phillips Peripherals, Inc. has introduced the **Elpho 20** nonimpact page matrix printer.

The Elpho 20 is said to print up to 20 page/min with noise levels at around 50db. It can print on cut-sheet plain paper, transparencies or labels in a variety of sizes and fonts from a library of over 95 character sets. The serial RS-232 interface transfers at up to 19.2K bit/sec. in full-duplex mode.

The Elpho 20 is priced at $19,800.

Phillips Peripherals, Unit 12, 385 Oyster Point Blvd., S. San Francisco, Calif. 94080.

■

Brother International Corp. has announced the **M-1109** dot matrix printer.

The 9-pin, bidirectional M-1109 features 80 columns and up to 100 char./sec. printing. In near-letter-quality mode it prints at 25 char./sec. It has a Centronics Data Computer Corp. parallel and an RS-232C serial interface. The M-1109 costs $269.

Brother International, 8 Corporate Place, Piscataway, N.J. 08854.

■

C. Itoh Digital Products, Inc. has announced the **C-310** personal printer said to operate at speeds up to 300 char./sec. in draft mode.

The 80-col. printer features near-letter-quality printing at 50 char./sec. and letter-quality printing at 28 char./sec. It has a graphics resolution of 240 by 144 dot/in., a variety of resident character fonts and a semiautomatic paper loader.

The C-310 is priced at $599.

C. Itoh Digital Products, Suite 220, 19750 South Vermont, Torrance, Calif. 90502.

Board-level devices

The Software Link, Inc. has unveiled the **AT Gizmo**, a card that reportedly allows IBM PC-DOS applications to use 4.6M bytes of extended memory in the IBM Personal Computer AT.

The card allows up to nine partitions containing a maximum of 512K bytes each. It attaches directly to the Intel Corp. 80286 processor and operates at up to 10 MHz.

The AT Gizmo card is priced at $295.

The Software Link, Suite 632, 8601 Dunwoody Place N.E., Atlanta, Ga. 30338.

■

Proximity Technology, Inc. has unwrapped **Cleanmail**, a plug-in circuit card and IBM Personal Computer software said to eliminate duplicates and identify near duplicates in data base applications.

The product performs character string comparisons at a speed of 400,000 char./sec., a spokesman claimed. It compares each record against all others to eliminate duplicates and also calculates the degree of similarity between records.

Compatible with data software packages that use standard ASCII data formats, Cleanmail is priced at $995 for both board and software.

Proximity Technology, 3511 N.E. 22nd Ave., Fort Lauderdale, Fla. 33308.

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Furthermore, the Sony Multiscan projectors, with screen sizes adjustable from 72 to 200 inches, are so intelligently conceived, you can superimpose computer graphics over video images, as you would on a professional video monitor.

Sony makes a complete line of video projectors, including the new, High Resolution 900 Series for those who are not routinely projecting computer data with their video images.

For more information on the one and only line of headache-proof video projectors, or Sony's National Video Workshops, write the Sony Information Center, P.O. Box 6185, Department MS, Union, NJ 07083.

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IBM gave dynamic file allocation to CICS ... but you need Netec's CAFC to make non-stop, round-the-clock CICS a reality. CAFC allows a single command to OPEN or CLOSE 5 or 50 files and to enable or disable the transactions. It allows CICS and your batch programs to automatically add, remove and share files.

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The CICS Dump Display Facility offers a variety of access modes for transaction and formatted dumps. You may view or print any dump without disturbing CICS. You may selectively inhibit dump generation or archive the dumps for after-the-fact off-line analysis. CDDF automatically switches the dump data sets for you.

Netec International, Inc.
P.O. Box 18538 • Dallas, TX 75218
(214) 324-2848 • Telex 314416 TELECOM UD

NEW PRODUCTS/MICROCOMPUTERS

Bondwell has announced the **Model 201 Multi-Function Card**, the **Model 202 Color Graphics Card**, the **Model 203 RAM Card** and the **Model 204 Multi-Purpose Card**, expansion cards for all IBM-compatible personal computers.

Model 201 features a real-time clock with battery backup, one RS-232C serial port and one joystick port, sockets for 64K- or 256K-byte random-access memory (RAM) integrated circuit chips, storage capacity up to 2M bytes and printer spooler.

Model 202 offers full IBM color graphics card compatibility. Model 203 offers sockets for 64K- or 256K-byte RAM integrated circuit chips, up to 1.5M bytes of memory, software for RAM disk and printer spooler.

Model 204 features an 80-col., monochrome monitor interface, disk drive interface and parallel interface, the vendor said.

Prices for Model 201, 202, 203 and 204 are $115, $126, $70 and $130, respectively.

Bondwell, #10, 3300 Seldon Center, Fremont, Calif. 94539.

■

MPPI, Ltd. has introduced **PC Lock IV**, a board-level security device designed to provide data security on any personal computer running IBM PC-DOS or Microsoft Corp. MS-DOS up to Version 3.1.

PC Lock IV offers logon security with full subdirectory control, data theft protection by encryption and an audit trail of system usage. It supports up to 16 users.

PC Lock IV is priced at $299.

MPPI, 2200 Lehigh Ave., Glenview, Ill. 60025.

Auxiliary equipment

Dynatech Computer Power, Inc. has introduced **Power Center**, an electronic power control and communications station.

Power Center comes in two models: Power Center/100 and Power Center/400. Both provide sequential power up and power down of up to five system components through electronic switching.

Power Center/400 provides data line protection to monitor and absorb telephone line surges continuously. It also comes with Dyna-Talk, the vendor's communications program.

Power Center/100 and Power Center/400 cost $189 and $469, respectively.

Dynatech Computer Power, 4744 Scotts Valley Drive, Scotts Valley, Calif. 95066.

■

Kent Marsh Ltd. has announced **Macsafe**, a data security product for the Apple Computer, Inc. Macintosh.

Macsafe enables Macintosh users to protect files in a safe area on Macintosh disks with a password known only to the user. Macsafe also is said to enable users to encrypt sensitive files using the National Bureau of Standards' Data Encryption Standard.

The Macsafe security product is priced at $69.95.

Kent Marsh, Suite 210, 1200 Post Oak Blvd., Houston, Texas 77056.

Controllers

Network Software Associates, Inc. has unveiled **Adaptcom**, an IBM Synchronous Data Link Control communications board for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

The interface board, used with the vendor's AdaptSNA software emulation packages, enables personal computer-to-host and personal computer-to-personal computer communications applications.

Adaptcom communicates at speeds up to 19.2K bit/sec. To provide remote communications, it operates with a separate synchronous modem, the vendor said.

The Adaptcom board is priced at $245.

Network Software Associates, 22982 Mill Creek, Laguna Hills, Calif. 92653.

Follow VM Systems Group for the Bear Necessities

At VM Systems Group, we're making tracks with our software! And, when you follow our footsteps, you find the most innovative, efficient solutions to the really hard VM problems. With each problem we tackle, we spend thousands of hours to make sure we've found the simplest possible solution for you. Each VM tool we offer must solve a specific problem effectively. It must not gobble up too much of your CPU, and it must be easy for you to use. Now, just take a look at the steps we've taken!

V/Force brings reliability to your production system. Some VM shops just can't afford to shut down for one hung user. V/FORCE gets the hung user off your system, frees the terminal, minidisks, and other devices. The user can then log on and resume work. It works even when the IBM FORCE command won't. You can depend on it.

V/Snap defends you against operating system mistakes. Okay. We all make mistakes—even an operating system as good as VM. The important thing is to find out what happened . . . without having to stop everything. V/SNAP takes a dump so you can figure out what went wrong, and why. And your system never misses a step.

V/Safe doesn't let one mistake blow away the whole weekend. That's right: V/SAFE forgives even a BIG mistake, so you can forget about most CP ABENDs. In most cases, you can even continue running after a CP loop or a machine check—you won't have to worry about your critical applications biting the dust. It's business as usual.

V/Find handles your searches for you. Machine language programmers: Have you ever said to yourself, "Now where did I put that . . .?" If you're the one, the answer is a resounding "YES!" V/FIND puts an end to your having to locate a character string in virtual or real memory—no more manual searches! After all, you have better things to do.

V/Temp allocates temporary disk space. We didn't like having to use DEFINE and FORMAT to get temporary disk space. When you want disk space, you want it fast. That's why V/TEMP almost always finds you instantly to a preformatted disk. It's easy to use, with no dependents and no pitfalls. Why take two steps when one will do?

V/Spell makes you look good, fast. Who wants a batch spelling checker? Not us! So we developed V/SPELL—an interactive spelling checker to use under XEDIT. It takes only a few minutes to install, and you can check for misspelled words on line and correct them with a single keystroke. You never looked better.

When you turn to VM Systems Group, you know you can depend on a team of experts whose experience with VM goes back to the very beginning. In those days, some people questioned whether or not VM would ever be used as a mainstream operating system. But we knew all along how powerful VM could be. In fact, we think that VM is the best operating system in the world. And we have lots of ideas on how to make it better.

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VM Systems Group
Solving the Hard VM Problems

NEW PRODUCTS/COMMUNICATIONS

Advanced Computer Communications has unveiled the **ACP 5100 single-board communications processor** that attaches to a Digital Equipment Corp. Microvax II.

The ACP 5100 supports the International Standards Organization High-Level Data Link Control LAP-B protocol, which is compatible with CCITT's X.25. It also supports line speeds up to 1M bit/sec. Users can adjust ACP 5100 frame size up to 4,096 bytes per frame and the number of its frame windows from one to seven.

ACP 5100 architecture is based on the Motorola, Inc. 10-MHz 68000 processor combined with direct memory access to the Q-bus and 512K bytes of on-board random-access memory.

The ACP 5100 costs $4,290.

Advanced Computer Communications, 720 Santa Barbara St., Santa Barbara, Calif. 910334.

Software

Mainline, application software for controlling the flow and use of information in wide-area networks is available from Motorola, Inc.'s **Motorola Information Systems Group**.

The package can search networks automatically or by operator control. It can access application programs, files and data stored in up to eight mainframes, according to the vendor.

Mainline runs on Motorola Series 4000 and 5000 minicomputers and communicates under standard 3270 line protocols.

With Mainline, all systems that use 3270 or asynchronous communications protocols can be linked in a network.

The price of Mainline is $1,500.

Motorola Information Systems/Four-Phase, Inc., 10700 N. De Anza Blvd., Cupertino, Calif. 95014.

WHEN IT COMES TO BUILDING WIDE-AREA NETWORKS, THERE'S NO SUBSTITUTE FOR EXPERIENCE.

While any number of companies can offer to sell you a private wide-area network, one company can offer you 25 years of computer and communications experience along with it. BBN Communications.

Experience that includes designing and building the world's first packet-switching network for the U.S. government back in 1969. Since then, it has evolved into the world's largest wide-area network, the Defense Data Network, connecting over 30,000 users throughout the world.

But the U.S. Government isn't the only customer with tough networking problems that BBN has helped to solve. Numerous major corporations, among them Wang, Weyerhaeuser, and MasterCard, not to mention European giants like England's National Westminster Bank and Italy's largest corporation, ENI, have also found the answers they were looking for from us. Each came to BBN with a unique networking problem—from integrated voice/data transmission to electronic mail to credit authorization—and each came away with a unique networking solution.

If you're going to make a major commitment to a wide-area network vendor, only three things count. Experience, experience, and experience. In wide-area networking only one company delivers it all.

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70 Fawcett Street, Cambridge, MA 02238
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bbn

SBE, Inc. has introduced **SBE/X.25**, a protocol hardware/software package for Multibus systems.

The package conforms to the CCITT X.25, X.29 and X.32 recommendations and supports CCITT procedures for duplex point-to-point links. It is offered on three different Motorola, Inc. 68000-based boards.

Hardware options include a choice of two, four or eight serial ports, rates from 1 bit to 3M bit/sec., an on-board random-access memory in 128K-, 256K-, 512K- or 1M-byte quantities and two or four direct-memory access channels.

Prices start at $1,200 each for 100 two-port communications boards with 128K bytes of memory and the X.25 package.

SBE, 2400 Bisso Lane, Concord, Calif. 94520.

Multiplexers/modems

Complexx Systems, Inc. has announced **TX3**, its statistical multiplexer.

TX3 is a 3-channel statistical multiplexer that compresses the data from as many as three remote devices onto one phone line. All three devices can communicate simultaneously at speeds up to 9.6K bit/sec. Features of TX3 include speed and code conversion and automatic error correction.

TX3 is compatible with most ASCII, asynchronous, RS-232 computers, peripherals and personal computers. Its composite port uses any full-duplex synchronous modem, leased line or dial-up.

TX3 costs $640.

Complexx Systems, 4930 Research Drive, Huntsville, Ala. 35805.

■

Scitec Corp. has announced the **BSP56 Bit Synchronous Processor**, a time-division subrate multiplexer said to subdivide an AT&T Dataphone Digital Service network trunk into lower synchronous channel speeds.

The multiplexer features integrated voice and data within one unit. It connects to a variety of transmission services using standard RS-232, RS-422, RS-423, RS-499 and V.35 interfaces. Other features are menu-formatted diagnostics, statistics and configuration.

The Scitec BSP56 Bit Synchronous Processor is priced at $5,600.

Scitec, 850 Acquidneck Ave., Middletown, R.I. 02840.

■

Telebyte Technology, Inc. has announced the **Model 570 Quick Mux** eight-port short-haul multiplexer.

Each port of Quick Mux can accept full-duplex data

Continued on page 89

Continued from page 88

at rates up to 19.2K bit/sec. Each port also supports two control signals — one in each direction. The Model 570 does not require any configuration setup, and each port can operate at its own rate with any bit protocol.

The product costs $548.

Telebyte Technology, 270 E. Pulaski Road, Greenlawn, N.Y. 11740.

SYSTEMS & PERIPHERALS

Processors

Alcyon Corp. has announced a line of **prepackaged systems** based upon its own VMEbus processor, the A68VME, and Regulus, its real-time, AT&T Unix 5.2-compatible operating system.

The systems also include Alcyon's C68 optimizing C compiler. Prices range from $7,495 for a system with a 20M-byte disk and 3½-in. floppy drive to $17,495 for a system with two 85M-byte disks and a 60M-byte streamer.

Alcyon, 5010 Shoreham Place, San Diego, Calif. 92122.

■

Emerald Computers, Inc. has announced the **ESB II** single-board computer.

The ESB II is based on the Motorola, Inc. 68000 microprocessor family. The design allows the choice of either the 68000 or the 68010 processor running at 8, 10 or 12.5 MHz and up to 1M byte of dynamic random-access memory (RAM).

Prices range from $695 for a single unit of the 68000 8-MHz version with 128K bytes of dynamic RAM to $995 for a single unit of the 68000 12.5-MHz version with 1M byte of dynamic RAM.

Emerald Computers, 16515 S.W. 72nd Ave., Portland, Ore. 97224.

Data storage

Bubbl-Tec, a division of PC/M Inc., has announced the **VMH-1 Bubbl-Board**, a magnetic bubble mass storage system for VMEbus computers that use plug-in cartridges.

The VMH-1 system provides 512K bytes of nonvolatile mass storage on a dual-wide VMEbus module.

The 512K-byte version costs $2,899 in quantities of 10. Extra Bubbl-Pacs cost $135 each.

Bubbl-Tec, 6800 Sierra Court, Dublin, Calif. 94568.

■

Emulex Corp. has announced the **EQ2** Digital Equipment Corp.-compatible storage subsystem and the **CV422** adapter for asynchronous RS-232 devices.

The EQ2 subsystem is compatible with DEC's LSI-11, Micro/PDP-11 and Microvax II. It comes in two configurations. The EQ2/70-S includes a 67M-byte formatted disk drive, chassis and power supply plus a streaming cartridge tape drive. The EQ2/110-S has a 110M-byte disk drive with chassis and power supply, embedded with a tape cartridge drive providing up to 70M bytes of backup storage capacity.

The CV422 adapter allows conversion of existing RS-232 equipment to the RS-422 standard. It comes in self-powered and host-powered models.

The price of the EQ/70-S in a quantity of 25 is $6,357, and for the EQ2/11-S it is $7,995. The self-powered CV422 costs $95, and the host-powered model costs $85.

Emulex, P.O. Box 6725, 3545 Harbor Blvd., Costa Mesa, Calif. 92626.

■

Distributed Logic Corp. has introduced the **DQ238** storage module drive (SMD)-compatible disk controller for use with Digital Equipment Corp. LSI-11 computers.

The DQ238 controller allows users to interface one or two SMD disk drives in any combination of sizes and capacities to LSI-11 through LSI-11/73 computers. Standard SMD drives may be used with the controller, including 8- and 14-in. drive sizes as well as removable pack-type drives.

The DQ238 controller costs $2,195.

Distributed Logic, P.O. Box 6270, 1555 S. Sinclair St., Anaheim, Calif. 92806.

■

General Micro Systems, Inc. has announced the **GMSVO9 mass storage controller** said to provide SMD and QIC-02 interfaces for VMEbus systems.

The module is a disk/tape controller that works without interleaving, providing transfer rates up to 16M bit/sec.

The GMSVO9 controls up to two SMD and up to four QIC-02 interfaces to the VMEbus.

Prices for the controller range from $2,495 to $3,295.

General Micro Systems, 4740 Brooks St., Montclair, Calif. 91763.

■

Dual Systems Corp. has introduced the **VUSC Universal Storage Controller** for VMEbus-based systems.

The VUSC is a dual-height VMEbus module. It is said to control hard and floppy disks, optical memories, backup devices and printers, which employ either the small computer systems interface (SCSI), ST-506 or SA-450 interface protocols. It can also serve as a VMEbus master.

According to the vendor, a single VUSC can simultaneously control two ST-506 drives, two SA-450 floppy disks and up to eight SCSI devices.

Continued on page 90

SAS Institute Inc. Announces

Lattice C Compilers for Your IBM Mainframe

Two years ago...
SAS Institute launched an effort to develop a subset of the SAS® Software System for the IBM Personal Computer. After careful study, we agreed that C was the programming language of choice. And that the Lattice® C compiler offered the quality, speed, and efficiency we needed.

One year ago...
Development had progressed so well that we expanded our efforts to include the entire SAS System on a PC, written in C. And to insure that the language, syntax, and commands would be identical across all operating systems, we decided that all future versions of the SAS System – regardless of hardware – would be derived from the same source code written in C. That meant that we needed a C compiler for IBM 370 mainframes. And it had to be good, since all our software products would depend on it.

So we approached Lattice, Inc. and asked if we could implement a version of the Lattice C compiler for IBM mainframes. With Lattice, Inc.'s agreement, development began and progressed rapidly.

Today...
Our efforts are complete – we have a first-rate IBM 370 C compiler. And we are pleased to offer this development and to you. Now you can write to a single language that is source code compatible with your IBM mainframe and your IBM PC. We have faithfully implemented not only the language, but also the supporting library and environment.

Features of the Lattice C compiler for the 370 include:

- Generation of reentrant object code. Reentrancy allows many users to share the same code. Reentrancy is not an easy feature to achieve on the 370, especially if you use non-constant external variables, but we did it.
- Optimization of the generated code. We know the 370 instruction set and the various 370 operating environments. We have over 320 staff years of assembler language systems experience on our development team.
- Generated code executable in both 24-bit and 31-bit addressing modes. You can run compiled programs above the 16 megabyte line in MVS/XA.
- Generated code identical for OS and CMS operating systems. You can move modules between MVS and CMS without even recompiling.
- Complete libraries. We have implemented all the library routines described by Kernighan and Ritchie (the informal C standard), and all the library routines supported by Lattice (except operating system dependent routines), plus extensions for dealing with 370 operating environments directly. Especially significant is our byte-addressable Unix®-style I/O access method.
- Built-in functions. Many of the traditional string handling functions are available as built-in functions, generating in-line machine code rather than function calls. Your call to move a string can result in just one MVC instruction rather than a function call and a loop.

In addition to mainframe software development, you can also use our new cross-compiler to develop PC software on your IBM mainframe. With our cross-compiler, you can compile Lattice C programs on your mainframe and generate object code ready to download to your PC.

With the cross-compiler, we also offer PLINK86™ and PLIB86™ by Phoenix Software Associates Ltd. The Phoenix link-editor and library management facility can bind several compiled programs on the mainframe and download immediately executable modules to your PC.

Tomorrow...
We believe that the C language offers the SAS System the path to true portability and maintainability. And we believe that other companies will make similar strategic decisions about C. Already, C is taught in most college computer science curriculums, and is replacing older languages in many. And almost every computer introduced to the market now has a C compiler.

C, the language of choice...
C supports structured programming with superior control features for conditionals, iteration, and case selection. C is good for data structures, with its elegant implementation of structures and pointers. C is conducive to portable coding. It is simple to adjust for the size differences of data elements on different machines.

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At SAS Institute, we support all our products. You license them annually; we support them continuously. You get updates at no additional charge. We have a continuing commitment to make our compiler better and better. We have the ultimate incentive – all our software products depend on it.

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Continued from page 89

In quantities of one to 10, the VUSC costs $2,190.

Dual Systems, 2530 San Pablo Ave., Berkeley, Calif. 94702.

Terminals

Micro-Term, Inc. has announced the **Model 420, Model 425, Model 440 and Model 450**, 14-in. emulation terminals said to offer full tilt and swivel.

The Model 420 is a Digital Equipment Corp. VT220 emulation terminal, the Model 425 is a DEC VT220-compatible terminal, the Model 440 is a DEC VT240 emulation terminal, and the Model 450 is a Wyse Technology, Inc. WY 50-compatible unit.

The 420, 425 and 440 each provide VT100, VT52 and ANSI X3.64 emulation; user-programmable compose and function keys; a bidirectional printer port; and the ability to erase or save in 80- or 132-col. formats. Prices are $695 for the 420, $895 for the 425, $1,695 for the 440 and $595 for the 450.

Micro-Term, 150 Saratoga Ave., Santa Clara, Calif. 95050.

Printers/plotters

Intermec Corp. has announced the **Model 9510** bar code reader.

Model 9510 features a 16-bit microprocessor, allowing the 9510 to read and discriminate automatically between the major industrial bar codes. Other features include two input ports: one for an Intermec 1520 laser scanner and the other for Intermec's digital wand or slot scanner.

Standard interfaces include RS-232C and RS-422. Data can be transferred to the host computer at a rate of up to 19.2K bit/sec., according to the vendor.

The Model 9510 and wand powerpack cost $495.

Intermec, P.O. Box 360602, 4405 Russell Road, Lynnwood, Wash. 98045.

■

NBI, Inc. has announced the **Oasya Laser Printer Model 10** desktop printer.

The Oasys Laser Printer Model 10 offers up to 31 different fonts that may be shared by multiple printers.

The Model 10 laser printer prints up to 10 page/minute with a resolution of 300 by 300 dot/in.

The product attaches to any Oasys 64 or 54/ES control unit, according to the vendor.

The Oasys Model 10 sells for $7,995, including copier and interface.

NBI, P.O. Box 9001, Boulder, Colo. 80301.

Power supplies

MPL Power Systems, Inc. has announced a **Load Isolation Set** (LIS) for protecting computer loads from electrical aberrations.

According to the vendor, stored energy allows the LIS to ride through total power outages of up to 500 msec. The LIS consists of a motor generator set with all associated controls and instrumentation.

Sizes range from 30 kVA to 1,000 kVA, with single modules priced from $21,000 to $140,000.

MPL Power Systems, 3011 Lincoln Ave., Richmond, Va. 23228.

Board-level devices

Sigma Information Systems, Inc. has announced the **SDC-RQD11-SC** quad-height, Q-bus storage module drive (SMD) disk controller.

The controller is designed to interface two physical SMD-type disk drives to the Q-bus via Digital Equipment Corp.'s Mass Storage Control Protocol (MSCP).

The SDS-RQD11-SC reportedly features the ability to handle up to 3M-byte transfer rates, 1M byte of cache memory, no sector interleaving, automatic overlapped seek and complete controller and drive off-line testing.

The controller is software compatible with all DEC operating systems supporting MSCP. It is hardware compatible with the DEC Microvax II, LSI-11/73 and LSI-11/23.

The controller costs $1,850.

Signma Information Systems, 3401 E. La Palma Ave., Anaheim, Calif. 92806.

■

Versatec, Inc. has introduced the **Model 115** multibus interface board.

The board was designed to allow Versatec controller and plotter products to be configured on Apollo Computer, Inc. systems running the AEGIS operating system.

The Model 115 interface board is compatible with all Versatec 200 dot/in. plotters, in both monochrome and color.

Two different models are available: the Model 115-02 is the differential version; the Model 115-03 is the transistor-transistor logic version.

The Model 115 interface board costs $1,500.

Versatec, 2710 Walsh Ave., Santa Clara, Calif. 95051.

Auxiliary equipment

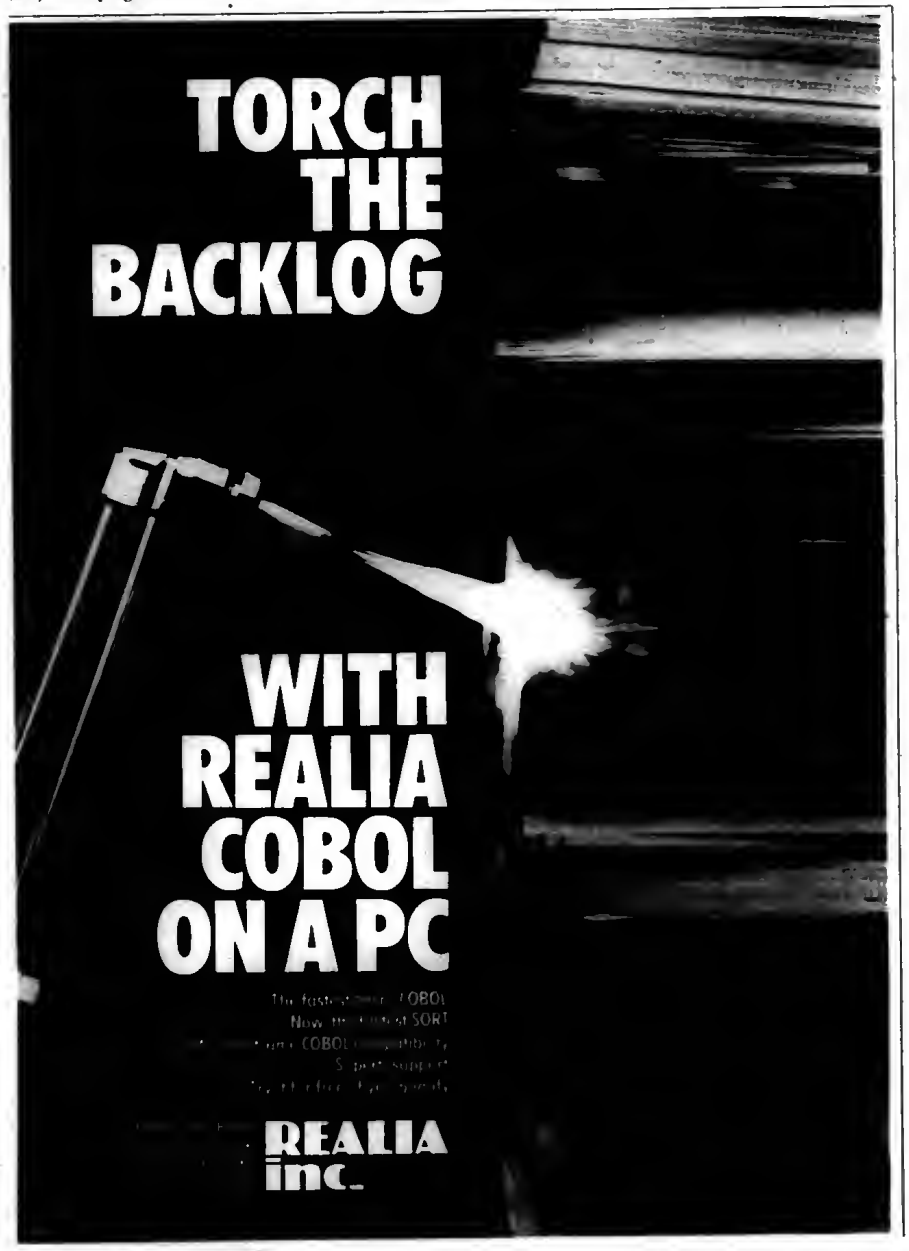
Perfectdata Corp. has added the **Dial 'N File-20** diskette storage system for 3½-in. floppy diskettes to the company's line of computer accessories.

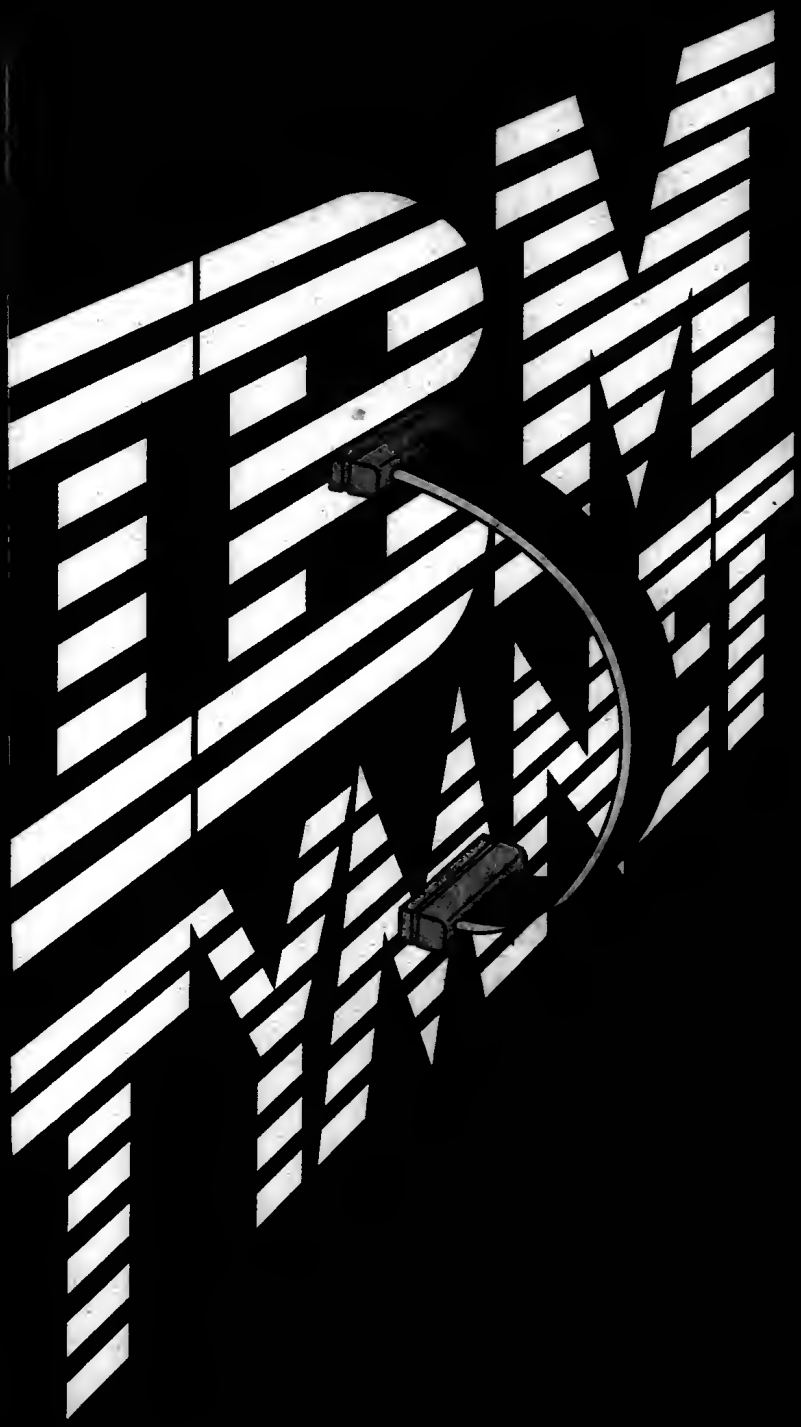
The Dial 'N File-20 holds 20 3½-in. diskettes.

The storage product reportedly features a mechanism that lifts each diskette individually for viewing and selection.

The price of Dial 'N File-20 is $19.95.

Perfectdata, Suite 4060, 2049 Century Park E., Los Angeles, Calif. 90067.

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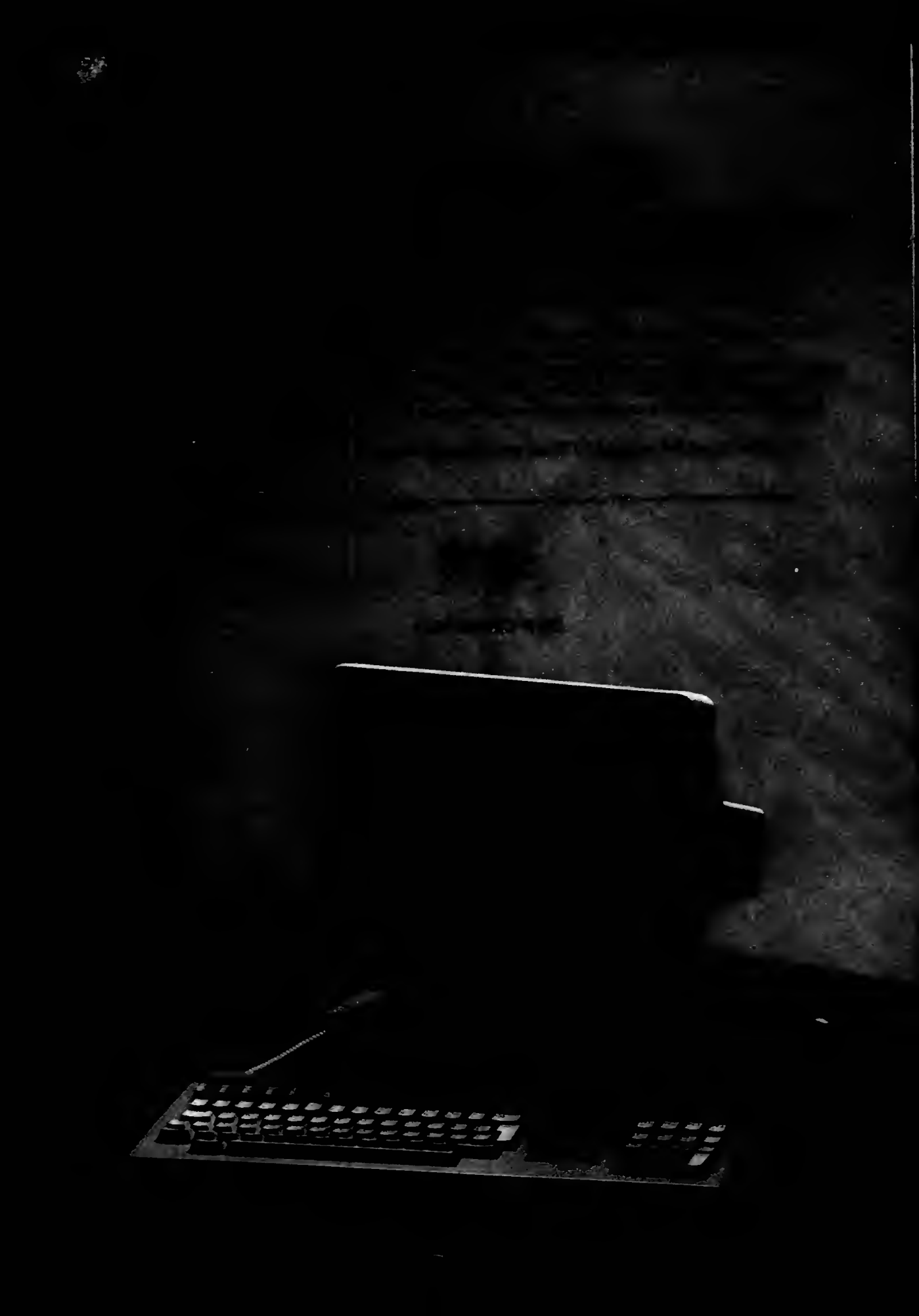

NEWS

CALENDAR

WEEK OF FEBRUARY 2

FEBRUARY 2-5, SCOTTSDALE, ARIZ. — **Sixth Management Conference of the Value Group.** Contact: Value Group, Inc., Suite 1717, 435 N. Michigan Ave., Chicago, Ill. 60611.

FEBRUARY 3-6, CINCINNATI — **Fourteenth Annual ACM Computer Science Conference and Employment Register.** Contact: Orrin E. Taulbee, Association for Computing Machinery, Department of Computer Science, University of Pittsburgh, P.O. Box 13525, Pittsburgh, Pa. 15243.

FEBRUARY 3-6, LAS VEGAS — **AFCOM's 6th Annual Conference and Trade Show.** Contact: Association for Computer Operations Managers, Suite 201, 11501 Brookhurst, Garden Grove, Calif. 92640.

FEBRUARY 3-7, DALLAS — **Writing Procedures, Policies and Documentation.** Contact: Mary Ann Cluggish, Information Mapping, Inc., 275 Wyman St., Waltham, Mass. 02154. Also being held Feb. 10-14 in Washington, D.C.

FEBRUARY 3-7, MONTEREY, CALIF. — **ATI '86 — Seventh Annual Symposium on Automation Technology, CAD/CAM and Engineering Data Handling.** Contact: Jeff Smith, American Technology Institute, Inc., P.O. Box 242, Pebble Beach, Calif. 93953.

FEBRUARY 4-6, NEWPORT BEACH, CALIF. — **1986 Patran Users Conference.** Contact: Software Products Division, PDA Engineering, 1833 E. Alton Ave., Irvine, Calif. 92714.

FEBRUARY 4-7, ANAHEIM, CALIF. — **Third Annual Uniforum.** Contact: /Usr/group International Network of Unix Users, Suite 200, 4655 Old Ironsides Drive, Santa Clara, Calif. 95054.

FEBRUARY 5-7, HOUSTON — **Strategic Data Planning and Modeling.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

FEBRUARY 5, DEDHAM, MASS. — **Elements and Applications of Microcomputers in the Graphic Arts Industry.** Contact: Frank R. Trocki, Graphic Arts Program, Northeastern University Center for Continuing Education, 370 Common St., Dedham, Mass. 02026.

WEEK OF FEBRUARY 9

FEBRUARY 9-12, ATLANTA — **SAS Users Group International's Eleventh Annual Conference — SUGI 11.** Contact: SUGI Coordinator, SAS Institute, Inc., Box 8000, SAS Circle, Cary, N.C. 27511.

FEBRUARY 9-12, ORLANDO, FLA. — **American Bankers Association's 1986 Telecommunications and Financial Networks and Video Banking III Conferences.** Contact: Linda Gustavson, ABA Operations Group, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

FEBRUARY 9-13, PALM SPRINGS, CALIF. — **Third Annual Electronic Printing Systems Conference.** Contact: Dunn Technology, Inc., Suite 1, 1855 E. Vista Way, Vista, Calif. 92084.

FEBRUARY 10-11, NEW YORK — **Intro to Lotus — Advanced Lotus.** Contact: Center for Advanced Data Processing, Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

FEBRUARY 10-11, WASHINGTON, D.C. — **Writing Management Reports.** Contact: Mary Ann Cluggish, Information Mapping, Inc., 275 Wyman St., Waltham, Mass. 02154. Also being held Feb. 25-26 in Somerset, N.J.

FEBRUARY 10-12, ALBUQUERQUE, N.M. — **Fiber-Optic Technology Training.** Contact: Linda Castle, Optoelectronic System Consultants, P.O. Box 35525, Albuquerque, N.M. 87176.

FEBRUARY 11-12, NEW YORK — **IBM's Master Plan, 1986-1990.** Contact: Yankee Group, 14th Floor, 89 Broad St., Boston, Mass. 02110.

See CALENDAR page 94

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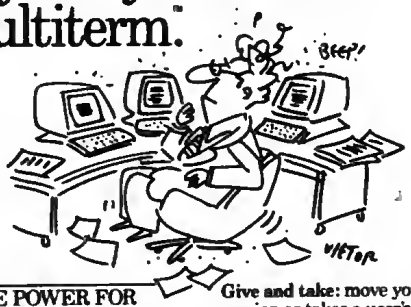

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NEWS

CALENDAR from page 93

Also being held Feb. 18-19 in San Francisco.

FEBRUARY 13-14, WASHINGTON, D.C. — **Bypassing the Local Telephone Exchange: Third Annual Conference.** Contact: Conference Registrar, Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

WEEK OF FEBRUARY 16

FEBRUARY 16-19, AUSTIN, TEXAS — **The DCEA Conference: Desktop Computers in Engineering and Architecture.** Contact: Donna Passons, University of Texas CLE Program, 727 E. 26th St., Austin, Texas 78705.

FEBRUARY 18-19, NEW YORK — **Intro to Dbase.** Contact: Center for Advanced Data Processing, Suite 402, 450 7th Ave., New York, N.Y. 10123.

FEBRUARY 18-19, SAN JOSE, CALIF. — **Institute of Electrical and Electronics Engineers, Inc. 1986 Annual Meeting.** Contact: IEEE, Annual Meeting Department, 10th Floor, 345 E. 47th St., New York, N.Y. 10017.

FEBRUARY 20, LONDON — **Europe Invitational Computer Conference Series.** Contact: Beatrice Labbe-Anderson, International Conference Director, Invitational Computer Conference, No. C-2, 3151 Airway Ave., Costa Mesa, Calif. 92626. Also being held Feb. 25 in Frankfurt, Feb. 27 in Zurich, March 4 in Paris and March 10 in Tel Aviv.

WEEK OF FEBRUARY 23

FEBRUARY 23-26, SAN FRANCISCO — **Seventh Structured Development Forum.** Contact: Garant and Associates, Seventh Structured Development Forum, 45 Via Navarro, Greenbrae, Calif. 94904.

FEBRUARY 24-26, MARINA DEL REY, CALIF. — **Trax User Conference.** Contact: Trax Softworks, Inc., 10801 National Blvd., Los Angeles, Calif. 90064.

FEBRUARY 24-28, LOS ANGELES — **Adajug/Sigada Conference.** Contact: Benjamin Brosgol, Vice-Chairman of Sigada, Alsys, Inc., 1432 Main St., Waltham, Mass. 02154.

FEBRUARY 24-29, PARIS — **MICAD '86.** Contact: Caby C. Smith, World Computer Graphics Association, Suite 399, 2033 M St. N.W., Washington, D.C. 20036.

FEBRUARY 26, DEDHAM, MASS. — **Marketing Strategies/Marketing Communications.** Contact: Frank R. Trocki, Graphic Arts Program, Northeastern University, Center for Continuing Education, 370 Common St., Dedham, Mass. 02026.

FEBRUARY 26-27, NEW YORK — **Intro to Symphony: The Spreadsheet — Symphony for Spreadsheet Users.** Contact: Center for Advanced Data Processing, Suite 402, 450 7th Ave., New York, N.Y. 10123.

FEBRUARY 26-28, NEW ORLEANS — **Innovative Systems, Inc. Annual Users Group Conference.** Contact: Innovative Systems, Inc., 341 Fourth Ave., Pittsburgh, Pa. 15222.

FEBRUARY 27, FORT LAUDERDALE, FLA. — **U.S. Invitational Computer Conference.** Contact: Suzanne Hubner, U.S. Conference Director, Invitational Computer Conference, No. C-2, 3151 Airway Ave., Costa Mesa, Calif. 92626. Also being held March 18 in San Jose, Calif., and April 2 in Nashua, N.H.

WEEK OF MARCH 2

MARCH 3-7, DENVER — **Sixth Annual Alpha Micro Users Society Convention.** Contact: Sharon Greene, Alpha Micro Users Society, 735 Walnut St., Boulder, Colo. 80302.

MARCH 4-6, PARIS — **Securicom '86 — Fourth Worldwide Congress on Communications Security and Protection.** Contact: Securicom-SEDEP, 8 Rue de la Michodiere, 75002 Paris, France.

MARCH 4-7, ORLANDO, FLA. — **Personal Financial Services.** Contact: Peggy Meyer, Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

WEEK OF MARCH 9

MARCH 10-14, DALLAS — **Second International Integrated Services Digital Networks Exposition.** Contact: Danae Fasano, Conference Coordinator, Information Gatekeepers, Inc., 214 Harvard Ave., Boston, Mass. 02134.

MARCH 12-14, DETROIT — **Artificial Intelligence for the Automotive Industry — The Demystification.** Contact: Dale Mason, Technical Activities Department, Society of Manufacturing Engineers, Computer and Automated Systems Association of SME, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

WEEK OF MARCH 16

MARCH 17-21, MILWAUKEE — **Test Data Acquisition and Processing for Instrumentation Applications.** Contact: John T. Snedeker, Program Director, Center for Continuing Engineering Education, University of Wisconsin at Milwaukee, 929 N. Sixth St., Milwaukee, Wis. 53203.

MARCH 18-21, LAS VEGAS — **Check Processing.** Contact: Peggy Meyer, Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

MARCH 19-21, LAS VEGAS — **CDLA Spring Meeting.** Contact: Dianne L. Sims, Manager of Convention Planning, Computer Dealers and Lessors Association, Inc., 1212 Potomac St. N.W., Washington, D.C. 20007.

MARCH 19-21, BLACKSBURG, VA. — **Personal Computer Interfacing for Scientific Instrument Automation.** Contact: Linda Leffel, C.E.C., Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

WEEK OF MARCH 23

MARCH 24-26, CHICAGO — **Systems One Conference and Exposition.** Contact: Michael A. Tew, Technical Activities Department, Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

MARCH 24-27, SINGAPORE — **Artificial Intelligence '86 Conference: AI and Its Applications — A State of the Arts Review.** Contact: John Tagler, Elsevier Science Publishers, 52 Vanderbilt Ave., New York, N.Y. 10017.

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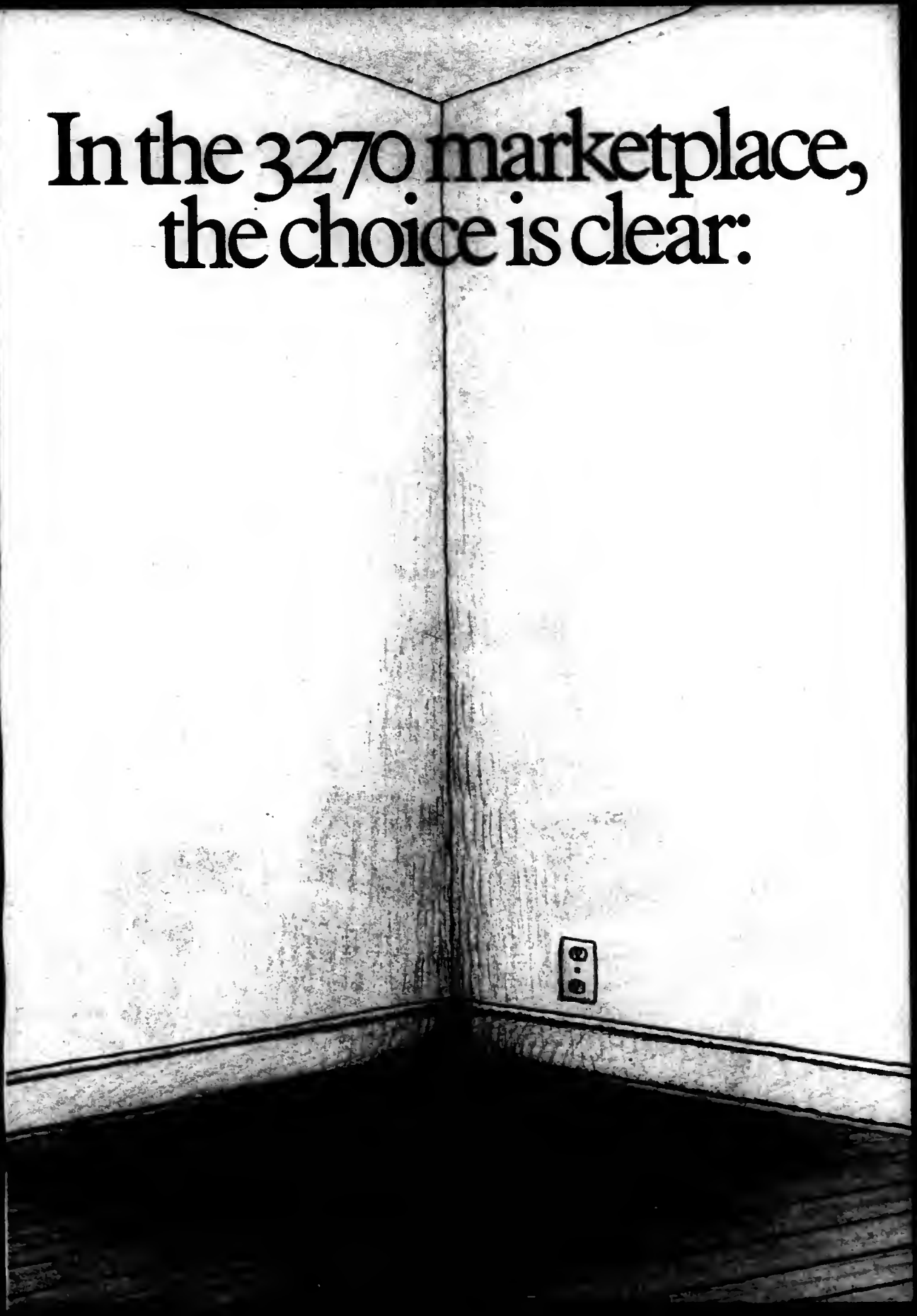

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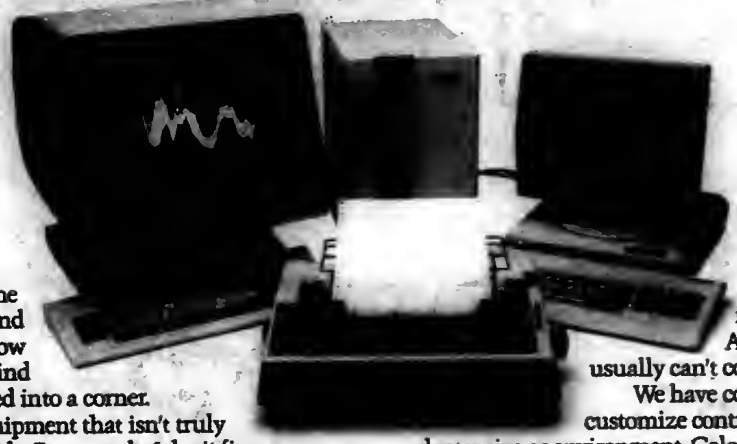

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BUNCH ripe for merger

From page 122

By 1990, Bellomy asserted, it is unlikely that any of the BUNCH companies will exist in their present forms.

All will either have merged with competitors or larger firms or will have sold off major divisions, as CDC is already hoping to do in an effort to raise cash to pay off loans.

However, one of Mintz's colleagues at Broadview, Harvey L. Poppel, warns that the BUNCH companies will face obstacles, because of their inherent corporate cultures, that will make mergers difficult.

On the question of a BUNCH merger, Poppel, who is Broadview's merger specialist, maintained, "conceptually, the answer is yes; but tactically, it can only happen with great, great difficulty."

Each BUNCH company, he explained, has a bureaucratic and hierarchical corporate culture, and all, save Burroughs, are staffed by long-time careerists who would fight a merger to save their jobs.

It was a conflict of corporate cultures and a fight over the price tag that wrecked the proposed merger of Sperry and Burroughs, Poppel observed.

On the other hand, he noted, one of the biggest arguments in favor of a BUNCH merger is "pure R&D. There's no question that these firms are involved in the same kinds of development projects."

In addition, Poppel said, a merger of two BUNCH players would give the new company economies of scale in manufacturing and service that neither of the two now have separately.

> ***Though Sperry and Burroughs never went to the altar, speculation over a marriage in the BUNCH has only intensified.***

Of the BUNCH members, Poppel said that Burroughs, Sperry and NCR are all in positions to make acquisitions while CDC and Honeywell only appear to be acquisition targets.

CDC likely target

CDC, he elaborated, became a more likely merger target with the recent retirement of its chairman, William Norris [CW, Jan. 13].

"CDC looks like it needs to be merged with somebody," observed Thomas Lawton, industry analyst and editor of the "Computer Service Report," of Waltham, Mass.

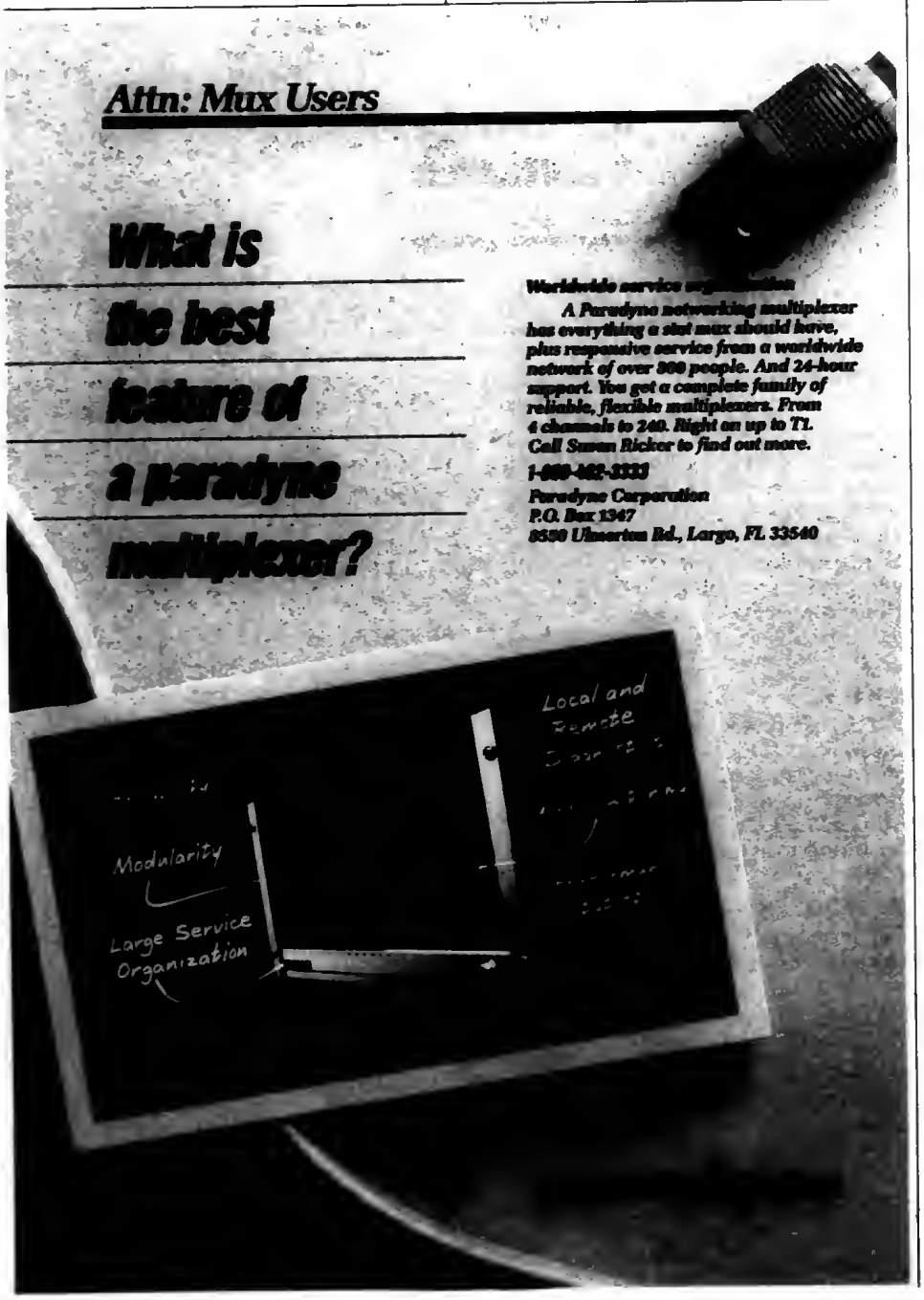
Lawton said a suitor could find it worthwhile to acquire the troubled Minneapolis-based vendor because "CDC still has a lot of assets it can sell."

Lawton discounted Honeywell and Sperry as potential CDC suitors but said that Burroughs is a likely candidate to buy CDC — or Honeywell.

"All play is in Burroughs' court," he said.

Though a merger within the BUNCH may be rumored, Poppel said, the larger computer industry players such as AT&T, Apple Computer, Inc. and Cray Research, Inc. should not be discounted as potential BUNCH company suitors.

In such a climate, he claimed, "I would be surprised if we don't see two major deals in 1986" affecting the BUNCH companies.



5¢ NICKELS AND DIMES

Hogan Systems, Inc. reported net income for the third quarter ended Dec. 31 of $816,000, or 6 cents per share, on revenue of $9.2 million. This compares with a loss of $1.4 million, or 10 cents per share, on revenue of $4.6 million reported in the like period one year ago.

■

Automatic Data Processing, Inc. reported revenue for the second quarter ended Dec. 31 of $290 million, compared with revenue of $254 million one year ago. Profits for the quarter were $24.6 million, or 68 cents per share, compared with $20.1 million, or 57 cents per share, in the same period last year.

Emulex Corp. announced earnings for the second quarter ended Dec. 29 of $25.4 million, compared with $27.2 million in the same period last year.

Profits were $1.6 million, or 12 cents per share, compared with $2.7 million, or 20 cents per share, from the like period one year ago.

■

Iomega Corp. reported net income for the fourth quarter ended Dec. 31 of $5.1 million, or 33 cents per share, on revenue of $33.9 million. This compares with net income of $2.1 million, or 15 cents per share, on revenue of $19.2 million in the corresponding quarter last year.

Net income for the full year was $14.9 million, or $1.01 per share, on revenue of $116.5 million. This compares with net income of $2.5 million, or 19 cents per share, on revenue of $51.6 million in the previous year.

■

Ask Computer Systems, Inc. reported revenue for the second quarter ended Dec. 31 of $19.1 million, compared with $21.3 million for the same quarter last year. Profits were $1.8 million, or 14 cents per share, compared with $2.1 million, or 18 cents per share, for the same period a year ago.

■

Miniscribe Corp. announced unaudited results for the fourth quarter ended Dec. 29. Revenue for the quarter was $35.6 million, compared with $28.1 million for the corresponding period a year ago. Profits were $2.5 million, compared with a loss of $6.5 million for the fourth quarter last year.

For the year, the company reported a net loss of $16.8 million on reveoue of $114 million. This compares with a loss of $5.3 million on revenue of $123.6 million in the previous year.

■

Micom Systems, Inc. reported revenue for the third quarter ended Dec. 31 of $49.1 million, compared with $48.8 million for the same period last year. Profits for the quarter were $4.2 million, or 24 cents per share, compared with $2.7 million, or 39 cents per share, for the comparable period last year.

■

Computer Task Group, Inc. announced revenue for the year ended Dec. 31 of $115.7 million, up 40% compared with $82.7 million reported in the same period a year ago. Profits for the year were $4 million, or $1.02 per share, compared with $2.1 million, or 68 cents per share, a year ago.

■

VLSI Technology, Inc. reported revenue for the fourth quarter ended Dec. 29 of $20.4 million, compared with $18.7 million in the previous year. A net loss was reported of $934,000, or 5 cents per share, compared with net income of $1.6 million, or 8 cents per share, a year ago.

The company reported revenue for the year of $78.7 million, compared with $69.5 million in the previous year. Profits for the year were $16,000, compared with $7 million, or 36 cents per share, in the previous year.

Integrated Device Technology, Inc. reported revenue for the third quarter ended Dec. 29 of $15 million, compared with $10.9 million in the same period last year. Profits were $1.2 million, or 9 cents per share, compared with $1.7 million, or 13 cents per share, in the comparable period one year ago.

■

Adage, Inc. reported a net loss for the third quarter ended Dec. 28 of $2.6 million, or 55 cents per share, compared with net income of $141,000, or 3 cents per share, a year ago. Revenue for the third quarter was $8.5 million, compared with $10.4 million in the same period a year ago.

■

Beehive International, Inc. had net sales of $13.7 million for the year ended Sept. 30, compared with $28.6 million in the previous year, a 52% decrease due to the effects of Chapter 11 of the Federal Bankruptcy Code. The net loss was reduced from $14.4 million, or $4.62 per share, in fiscal year 1984 to $8.1 million, or $1.18 per share, in fiscal year 1985.

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IBM results reviewed

From page 122

The big Internal Revenue Service laptop contract would be nice, but an unofficial calculation estimated that the sale of one basic Sierra — no vector processing, no disk drives — equals the proceeds from about 2,000 laptops.

The new year finds Big Blue slightly humbled. Chief Executive Officer John Akers said his company is proceeding with caution because of an uncertain U.S. economy.

For now, we will call IBM's fourth quarter a qualified success. But it is much more of a reflection of one company's efforts at profit reaping than it is the long-awaited uptick in the computer industry. The decline in the dollar, the introduction of solid products and moderate-to-drastic cost cuts by virtually every vendor have improved and will continue to improve industry conditions — but gradually.

With product and seasonal cycles running heavily in its favor, IBM could not quite salvage a profit growth year in the final quarter. Despite modest signs of encouragement elsewhere, that fact alone means that 1986 is off to a slow start.

■

Don't expect to find economist Adam Smith on Judge Harold Greene's best-seller list.

Greene recently clamped the brakes on the former Bell operating companies and the free-market moves that took them far away from good old local telephone service.

Greene's latest ruling may spoil the party for diversification-minded former Bell operating companies that had been getting more waivers from Bell system divestiture regulations than a journeyman professional football player. Greene seems to have taken personal umbrage at the idea of Ameritech data base management systems, Pacific Telesis Group cellular phones and Nynex Corp. retail computer stores.

If Greene prevails in this latest regulatory battle, it is the communications marketplace that stands to lose. There are countless market niches and acquisition candidates out there for cash-rich divested Bell operating companies, and it is hard to justify the creation of barriers to those opportunities.

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EXECUTIVE CORNER

Martin F. Parker has been elected president and chief executive officer of Genesis Electronics Corp. Most recently, Parker was vice-president of marketing and advanced systems at Compath National. Prior to that, he was employed by IBM, where he held numerous positions.

■

Raymond R. Maturi, president and chief operating officer of Systematics, Inc., has been elected to the additional post of chief executive officer.

■

Siltec Corp. has announced the appointment of **Stanley T. Myers** to the position of president and member of the board of directors.

■

Michael G. Cocks has been elected a corporate vice-president of Uccel Corp.

■

Data Recording Systems, Inc. has announced the following appointments: **David R. Spencer** has been appointed chairman, and **Carlos A. Dragovich** has been appointed president.

■

Star Technologies, Inc. has announced the appointment of **Herbert Shaw** as interim president and chief executive officer. Star also announced that Chairman and Chief Executive Officer **Jon A. Salquist** has announced his intention to take a one-year leave of absence from his present position with the company and to resign from the company's board.

■

George Herzfeld has been appointed to the position of vice-president and chief operating officer of Perfectdata Corp.

■

Mentor Graphics Corp. has announced the appointment of **Alberto Jimenez** to the position of vice-president and general manager of the company's automation products division.

■

Continental Telecom, Inc. has announced the following appointments: **William Y. O'Connor** has been promoted to executive vice-president and head of the company's Business Systems sector, and **William P. Kamachaitis** has been promoted to executive vice-president and head of the Federal Systems sector.

■

Monroe M. Spierer, a chief scientist with Computer Science Corp., has been named to the post of vice-president, advanced development, for the firms' Systems Division.

■

Thomas M. Cusson has been named director of technical computer operations for Honeywell, Inc.'s small computer and office systems group.

■

Apollo Computer, Inc. announced that **Robert M. Antonuccio**, vice-president and general manager, manufacturing group, and **Barry J. Fidelman**, vice-president and general manager, worldwide sales/services group, are leaving their positions. Both men are on special assignment

See EXECUTIVE page 101

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Human Resource Management That Helps Your Bottom Line

Settlement allows Apple preview

From page 122

that Jobs recruited for Next when he left Apple.

An Apple spokeswoman said the company was satisfied with the agreement. The company maintains it only filed the $5 million-plus lawsuit last September to protect the interest of its shareholders. Apple alleged that Jobs "violated his fiduciary responsibilities" by planning the new company while still chairman of Apple and by hiring key Apple employees and that he "secretly planned the formation of a company to compete with Apple."

A spokeswoman for Next said the company was satisfied by the settlement. The company is not concerned about Apple's product inspection rights, she said.

The day before the settlement, Apple President John Sculley said that he hopes to see a time come when Jobs "can be as welcome at Apple Computer as Steve Wozniak is." Wozniak, the other Apple founder who left Apple while Jobs was still at the reins, has returned as a consultant and worked on several projects.

"We were obviously concerned enough [about proprietary technology] that we entered into litigation," Sculley said. "No one wins when a founder is involved in litigation between the company he founded and himself."

Palo Alto attorney James Pooley, who specializes in litigation involving trade secrets and proprietary technology, said the case was typical in most of its legal issues but noteworthy because of the parties involved. "The chances that it would go to court were slim to none," he said.

Usually in such cases, an independent, technical expert, who has been told by both sides what to look for, inspects new technology, Pooley said. In this case, Apple will apparently conduct the investigation of Next's first machine itself.

Jobs funded his new venture in part by sales of his previously substantial quantity of Apple stock. Since the start of the year, he has sold shares worth approximately $20.4 million, which brings him from being the largest single shareholder to holding about 3.5%.

COMPUTER INDUSTRY

EXECUTIVE from page 100
to President and Chief Executive Officer Thomas A. Vanderslice.

■

Cap Gemini Dasd has announced the promotion of **James G. Kerridge** to the office of president. Before joining Cap Gemini Dasd, he was president of SMC Information Systems.

■

Gary G. Greenfield has been named president of Frey Associates, Inc. Before joining Frey, he was vice-president of technology for Execucom Syatems Corp.

■

John B. Monson has been elected president of Computer Maintenance Services Corp. Before joining Computer Maintenance Services he was a technician with Advanced Automation Industries, Inc.

■

Wall Data, Inc. has announced the appointment of **Bradford P. Hebert** to the position of president. Prior to joining Wall Data, Hebert held numerous positions with Data General Corp., Digital Eqipment Corp. and Avatar Technologies, Inc.

■

Docutel/Olivetti Corp. has announced the appointment of **Leon Harris** to the position of president of the office products division. He was most recently president and chief executive officer of Olympia U.S.A., and prior to that he was president of the personal computer division of Commodore International.

Skok Systems, Inc. has announced the following company promotions: **Nick Story**, previously chief operating officer, has been named president; and **David Skok**, previously president, has been named chairman of the board.

■

Policy Management Systems Corp. (PMSC) has announced several personnel changes. **Frank A. Helland** has been named senior vice-president for professional services and Columbia Processing Services. Helland previously held the position of vice-president and director of support services.

Ron E. Barker has been named a vice-president of PMSC. Previously Barker was the vice-president and general manager of PMSC's Canadian operation, Policy Management Systems Ltd.

■

Michael G. McMenamin has been named to the newly created post of vice-president of software products at Tact Technology, Inc. Prior to joining Tact, he was the executive vice-president at Value Computing, Inc.

■

Gary Handler has been elected vice-president of network planning for Bell Communications Research.

■

Ashton-Tate has announced the appointment of **Roy E. Folk** as executive vice-president for marketing and strategic planning.

■

Continental Telecom, Inc. recently announced that **Peter A. Thompson** resigned as president of Contel Computer Systems, formerly the Contel Cado division. Thompson became division president after Contel acquired the company he headed, Northern Data Systems, last July.

Burroughs Corp. Executive Vice-President **Donald E. Young** retired recently after 32 years with the company. His prior positions at Burroughs included executive vice-president of diversified products and chairman of the board of System Development Corp.

Business incubator boom: Start-up facilities expected to double in '86

FAIRFAX, Va. — There are more than 130 business incubators in operation in the U.S. and Canada, and that number may double in 1986, according to Dr. David N. Allen of the Institute of Public Administration at Pennsylvania State University.

An industry survey found that at least 100 more incubators are expected to open in 1986, he said. The facilities, sponsored by a variety of public and private organizations, are expected to number 1,000 by 1990, Allen said.

Business incubators are designed to help start-ups and struggling young firms to survive their early years in business. They typically provide affordable office space, shared office services and access to management assistance.

Roughly one-third of the start-ups in incubator facilities are in computer-related businesses, according to Carlos Morales, executive director of the new National Business Incubator Association, based in Fairfax.

He said the new trade association, which sponsors research and makes referrals, already has more than 100 members.

Morales explained that incubators are ideal for computer technology buffs who need to share expensive lab equipment and get business management and planning assistance from experts.

He said incubators are created by different types of organizations for a variety of reasons.

For example, state and city governments sponsor incubators to create jobs; private sector firms create them to make a profit; and universities view incubators as a way to capitalize on research, create jobs for students and strengthen links to industry.

Pennsylvania, with 22 small-business incubators, leads all states in nurturing start-ups, Morales said.

— **Mitch Betts**

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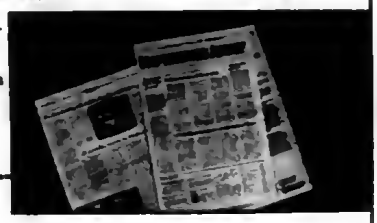

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You may have noticed that some of our sections have changed position within Computerworld. This is part of our ongoing effort to better serve you, the reader.

Our **Computer Industry** section will now begin on the next to last page and will read toward the front of the newspaper. This change has affected our **Classified** section; where **Position Announcements** formerly began the **Classified** section, it will now appear next to **Computer Industry. Classified** will now begin with **Buy-Sell-Swap.**

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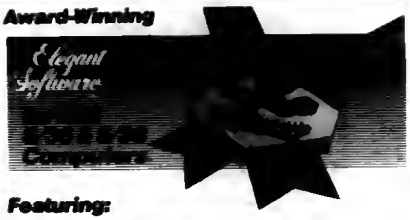

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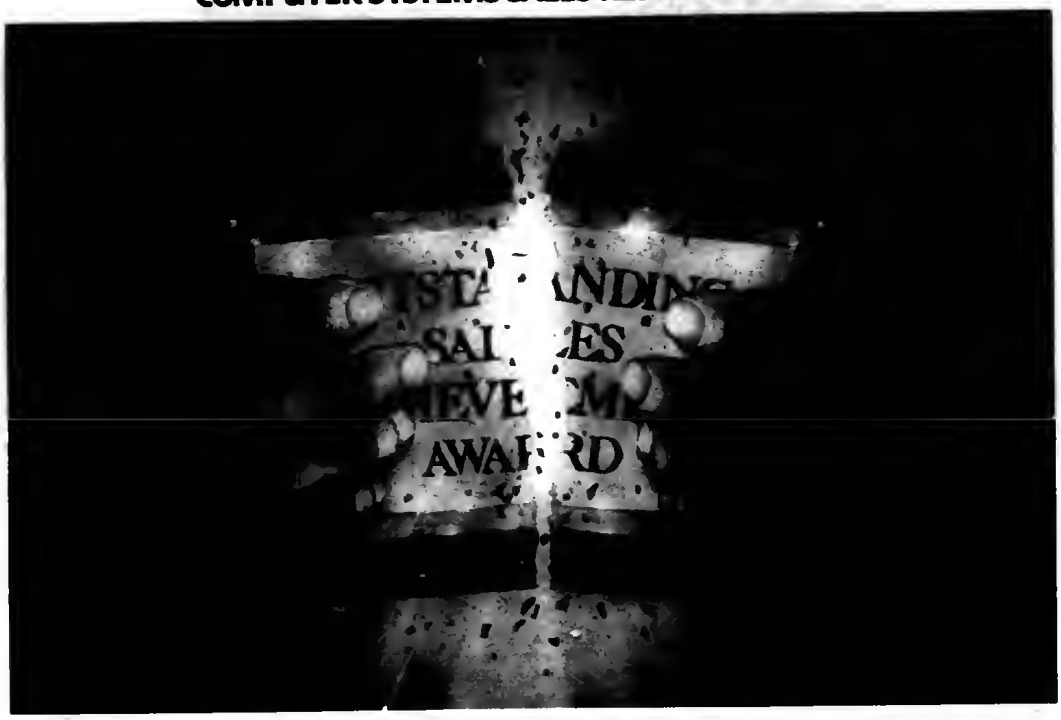

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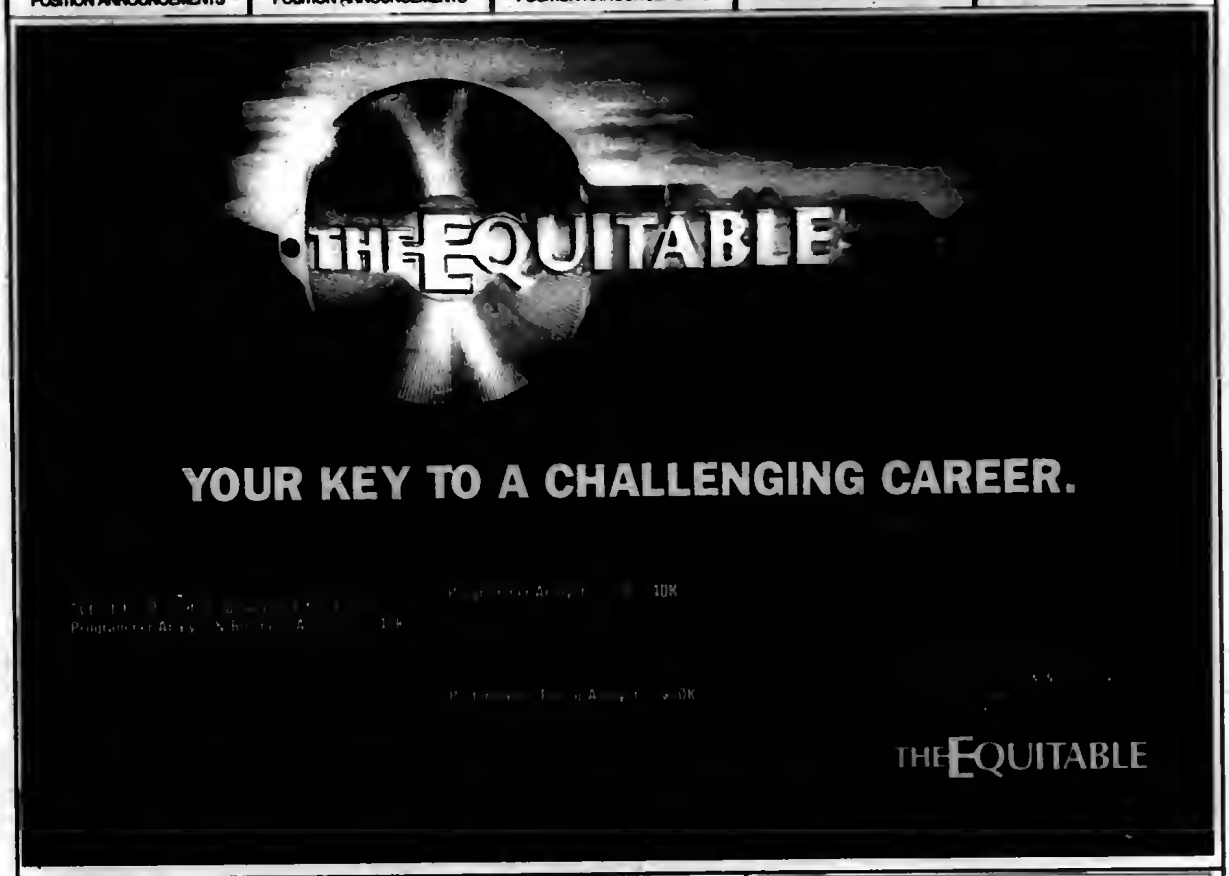

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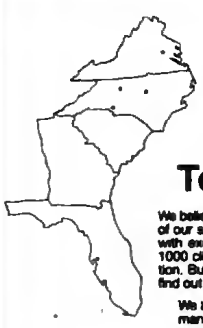

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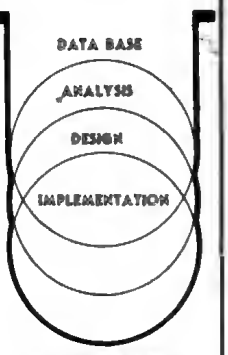

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COMPUTERWORLD

COMPUTERWORLD's paid circulation climbed to over 126,000 this fall. Folio 400 (Folio Magazine's study of trade publication performance) placed us first in total revenue. As the industry grows, so will **COMPUTERWORLD**. It will continue to offer the high quality news coverage and editorial content that has attracted its readers. What does that mean to you, our advertisers? Good news...in the form of wide exposure.

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A number of Executive Reports and Product Spotlights are scheduled to run in **COMPUTERWORLD** during 1986. Each of these features will focus on one aspect of the computer industry and give our advertisers a chance to reach a more select audience. These are some of the topics the features will cover:

Executive Reports

- Feb 10 - **DP as a Profit Center**
- Feb 24 - **Application Software Development**
- Mar 3 - **Mass Storage Systems**
- Mar 17 - **Managing Voice & Data Communications**
- Mar 24 - **Personal Computer Networks**
- Apr 28 - **Software Maintenance**
- May 19 - **Electronic & Voice Mail**
- June 30 - **Integrated OA Systems**

Product Spotlights

- Feb 17 - **2400 bit./sec. Modems**
- Mar 10 - **32-bit Workstations**
- Mar 31 - **Mainframe & Mini DBMS**
- Apr 21 - **Non-Impact Printers**
- May 12 - **Disaster Recovery**
- June 2 - **Word Processing Software**
- June 23 - **Personal Computer Graphics**

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Microsoft to buy Cytation

Purchase plans include CD-ROM applications

By Peggy Watt

BELLEVUE, Wash. — Dramatizing its commitment to the compact disk read-only memory (CD-ROM) market, Microsoft Corp. last week announced its intention to make its first corporate acquisition with the purchase of Cytation, Inc

Under terms of the purchase, Microsoft said it plans to hire Thomas M Lopez, the president of the 14-month-old San Francisco-based CD-ROM applications firm, as a Microsoft vice-president. Cytation will become Microsoft's CD-ROM division.

Microsoft will acquire Cytation's two application products, which are still in development. One of those products is reportedly being developed under contract by a third party. Sources said Lopez first approached Microsoft to sell one of Cytation's products and instead received an offer to sell the company.

Microsoft has previously demonstrated its interest in the growing mass-storage market by planning to host a CD-ROM conference in Seattle in March. The company is expected to lead a drive to develop nonproprietary industry standards for CD-ROM file formats.

"They've been pushing CD-ROMs for a while, but it's a technology that's going to have major impact at some point," said Bob Lefkowits, software analyst for Infocorp, a Cupertino, Calif.-based market research firm. "With Microsoft behind it, CD-ROM technology could appear sooner rather than later."

The planned acquisition is another indication of the maturing of Microsoft, which has said that 1986 is the target year for its initial public stock offering.

Microsoft would not disclose the financial terms of the Cytation acquisition or the date it will be completed. Lopez is expected to join Microsoft in mid-February.

Spectrum colors HP stock

ACTIVE ISSUES
Kathy Porteus

As speculation increases about Hewlett-Packard Co.'s introduction of its long-awaited 32-bit computer architecture, code-named Spectrum, investors regard HP with cautious optimism. At this time, the firm is expected to unveil its first Spectrum product by late February.

Analysts agree that Spectrum, which will use reduced instruction set computing technology, must satisfy HP's installed base and provide overdue migration paths to existing customers.

Of particular importance are HP 3000 minicomputer customers, who number more than 25,000. "But the bigger question beyond this captive audience is, How effective a product line will Spectrum be?" says Gordon Casey, a securities analyst and vice-president with Merrill Lynch, Pierce, Fenner and Smith, Inc.

John Levinson, a senior securities analyst with Goldman, Sachs & Co., says he doubts HP will enjoy a "huge amount of success at cracking new accounts with Spectrum. However, this does not really matter for the time being. The most critical factor for HP over the next 18 months is simply to make sure its installed base is happy and to grow within existing accounts."

Nevertheless, Casey maintains that HP is "clearly not going to show the 30% growth of past years. Investors are still sorting out what growth from HP is reasonable to expect from now on." Recently, HP's stock traded at 40½, up from 35⅞ at the end of November.

"Spectrum is expected to represent 5% of HP's corporate revenue in its 1987 fiscal year [ending Oct. 31, 1987] but is 40% of the current stock price," Levinson says. "HP can be a great stock over the next six months if Spectrum is well received and if it changes people's perception of HP, as I think it will. If Spectrum is a flop in people's minds . . . the stock will go down," he says.

According to Jay Cooper, a technology analyst with Eberstadt Fleming, Inc., investors have already toned down their expectations of Spectrum, which now is "not nearly as important to HP's stock price as it has been." Cooper says his information reflects HP's possible difficulty in converting HP 3000 software and suggests that the "smaller versions of Spectrum — those that will hook to the HP Series 1000 or Series 9000 — will come to market before the HP 3000 upgrade machine is deliverable."

Although Spectrum's actual contribution to HP's revenue will not begin to show until the company's 1987 fiscal year, Levinson predicts that there will be a "halo effect" from Spectrum that should stimulate activity in HP's other computer lines. For example, users will feel more comfortable buying an HP 3000 knowing they can later migrate to a new high-end product.

"In terms of units times the average selling price plus this halo effect," Levinson says, "Spectrum is worth in the neighborhood of 20% of HP's 1987 computer sales."

Also, Spectrum will likely be worth something to other companies, such as Ask Computer Systems, Inc., the largest HP 3000 reseller.

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

INDUSTRY NOTES

Bell makes final bow at Encore

C. Gordon Bell officially left troubled **Encore Computer Corp.**, although Encore Chairman and Chief Executive Officer **Kenneth Fisher** retained the right to use his services for one year. Bell is prohibited from joining or consulting with Encore's competitors.

■

In comments last week on the **Federal Communications Commission's Third Computer Inquiry**, **IBM** urged the FCC to require that equal access to telephone switches be made available to phone company competitors. IBM said the phone companies' monopoly on transmission facilities gives them little incentive to provide such access

The **U.S. International Trade Commission** (ITC) issued a preliminary finding that U.S. semiconductor manufacturers have indeed been injured by below-cost selling by Japanese vendors of 256K-byte memory chips. The **ITC's** report will go to the **U.S. Department of Commerce**, which has the power to levy a tariff on the Japanese-made chips.

■

Control Data Corp. sold off another piece of its **Commercial Credit Co.** subsidiary. Paris-based financial firm **Compagnie Bancaire** will purchase Commercial Credit's British operation, London-based **Commercial Credit Services Holdings Ltd.**

Climbing out of the slump

From page 122

per share. Sales rose 5% from $4.81 billion to $5.04 billion.

■ **Sperry.** The New York-based mainframe and defense systems firm posted a 9% third-quarter drop in overall profit from continuing operations, but earnings from its computer business grew 11% on a 14% rise in sales.

Overall revenue rose 7% from the year-earlier quarter to $1.40 billion. Net income fell to $57.9 million, or $1.20 per share, from comparable results of $74.4 million, or $1.33 per share, a year ago.

■ **Prime.** The Natick, Mass., minicomputer maker weighed in with some of the best full-year results among large vendors, reporting a 20% sales increase and a 10% jump in profits. Fourth-quarter results, boosted by the recently introduced Prime 2655, showed 18% earnings growth on a 23% revenue gain.

Prime earned $57.8 million, or $1.20 per share, from continuing operations for the year, up from $52.3 million, or $1.09 per share, in 1984. Revenue grew from $642.8 million to $769.7 million. Fourth-quarter profits were $17.4 million, or 36 cents per share, on $209.9 million in sales.

■ **Data General.** DG posted disappointing earnings of $1.1 million, or 4 cents per share, for its first quarter, compared with $23 million, or 87 cents per share, in its record-breaking quarter a year earlier. Revenue during the first quarter was $293.7 million, down from $333.7 million for the same quarter in 1984.

■ **Harris.** Continued sluggish demand for chips, terminals and private branch exchange equipment sent Harris' second-quarter profits down 33% from year-earlier levels. The revenue drop was less severe, falling from $585 million a year ago to $562.2 million. Harris earned $14.5 million, or 36 cents per share, compared with $21.7 million, or 54 cents per share, a year earlier.

■ **Stratus.** This industry success story continued rolling, roughly doubling its profits and revenue for both the fourth quarter and the year. OEM agreements with IBM and Burroughs helped the Marlboro, Mass., fault-tolerant systems vendor earn $8.6 million, or 45 cents per share, for the year, compared with $4.2 million, or 22 cents per share, from continuing operations in 1984 Sales jumped from $42.1 million to $80.1 million.

■ **Tandem Computers, Inc.** Stratus' fault-tolerant rival was not so fortunate in its first quarter, as pretax earnings dropped 14% from the December quarter of 1984. Net income fell from $14 million, or 34 cents per share, to $11.6 million, or 28 cents per share. Revenue increased 6.5% from $159.6 million to $170.1 million.

■ **Apollo.** The Chelmsford, Mass., workstation maker eked out a small profit after its disastrous third quarter, but it was not enough to place the firm in the black for fiscal 1985. Apollo earned $732,000, or 2 cents per share, on revenue of $70.7 million in the quarter, compared with an $8.3 million, or 25 cents per share, profit on $75.8 million in sales a year ago. For the year, Apollo lost $1.5 million, or 4 cents per share, despite a 40% increase in sales to $295.5 million.

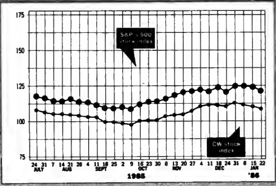
■ **Amdahl Corp.** The IBM plug-compatible machine vendor's quarterly earnings plummeted 41.6% on a 13% revenue increase. Profits before a one-time credit were $9.4 million, or 20 cents per share, down from $16.1 million, or 35 cents per share, a year earlier. Sales grew from $227.4 million to $257.2 million. For the year, profits from continuing operations fell 33% to $24.4 million or 51 cents per share, while sales climbed 10.6% to $862 million.

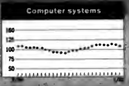
■ **Cray Research, Inc.** Despite a 24.7% drop in fourth-quarter earnings, the Minneapolis supercomputer maker posted 67% profit growth for the year. Cray earned $12 million, or 39 cents per share, in the quarter on revenue that increased 19.5% to $84.7 million. For the year, Cray's revenue grew 66% to $380.1 million. Earnings in 1985 were $75.6 million, or $2.49 a share, up from $45.3 million or $1.53 per share in 1984.

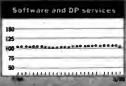
COMPUTER INDUSTRY

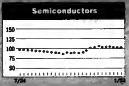
MITCHELL J. HAYES

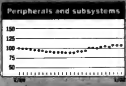
Computerworld stock trading index

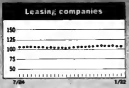


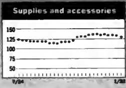












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	1/24/86	1/15/86
Software and DP services	103.9	104.1
Supplies and accessories	132.1	135.0
Leasing companies	128.7	102.7
Peripherals and subsystems	103.0	104.0
Computer systems	110.3	114.3
Semiconductors	102.7	103.0
CW stock index	109.1	110.2
Standard and Poor's 500 stock index	121.7	124.8

Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, JANUARY 22, 1986

EXCH		52 WEEK RANGE (1)		PRICE CLOSE JAN 22 1986	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS					
O	ALPHA MICROSYSTEMS	5-	9	6	+1/4	+4.3
O	ALTOS COMPUTER SYST	8-	14	12 7/8	-3/4	-5.5
4	AMDAHL CORP	10-	18	14 1/2	+1/2	+3.5
O	APPLE COMPUTER INC	14-	31	23 3/8	-1/2	2.0
O	APPOLLO COMPUTER	9-	31	13 1/2	+3/4	+5.8
N	AT&T	19-	26	22 1/8	-1 1/2	-6.3
N	BURROUGHS CORP	52-	68	63 5/8	+1 1/4	+2.0
O	COMPAQ COMPUTER CP	5-	14	12 3/4	0	0.0
O	COMPUTER AUTOMATION	1-	6	2	-5/8	-23.8
A	COMPUTER CONSOLES	5-	14	7	1/4	3.4
N	CONTROL DATA CORP	15-	39	18 7/8	-1 5/8	7.5
O	CONVERGENT TECHNOL	5-	13	12 3/8	-5/8	-4.8
O	CPT CORP	5-	8	6	-3/8	5.8
N	CRAY RESEARCH INC	25-	71	59 7/8	-1 3/4	2.8
O	DAISY SYSTEMS CORP	21	38	21 1/4	-4	-15.8
N	DATA GENERAL CORP	31-	76	41 1/4	-4 1/8	9.0
N	DATAPOINT CORP	5-	22	5	-1/4	-4.7
N	DIGITAL EQUIPMENT	85-	144	144 3/8	+2 5/8	+1.8
4	EECO INC	13-	16	14 1/2	-1/2	-3.3
N	ELECTRONIC ASSOC	3-	6	4 1/2	-1/8	2.7
N	FLOATING POINT SYST	19-	37	38 3/8	+2 3/8	+7.1
N	FOXBORO	22-	31	25 3/4	1/8	-0.4
N	GOULD INC	20-	38	27 3/8	-2 3/8	7.8
N	HARRIS CORP	22-	35	25 7/8	-1/8	-0.4
N	HEWLETT PACKARD CO	29-	39	38 3/8	+1	+2.8
N	HONEYWELL INC	54-	87	74 1/8	-3 3/8	-4.3
N	IBM	117-	156	144 1/4	-8 3/8	-5.4
O	IPL SYSTEMS INC	1-	4	1 1/4	1/8	-9.0
N	ITT CORP	28-	38	38 3/4	-1 1/2	-3.8
N	M/A-COM INC	13-	24	13 5/8	-1/2	-3.5
N	MANAGEMENT ASSIST	2	38	2	-7/8	-30.4
N	MATSUSHITA ELEC(ADR)	49-	68	63 3/8	+1 3/8	+2.2
O	MENTOR GRAPHICS	13-	30	16 7/8	+1 1/8	+7.1
N	MODULAR COMPUTER SYS	6-	8	7	+1/8	+1.8
N	MOHAWK DATA SCI	1-	13	2	-1/8	-5.8
N	NBI INC	11-	20	10 3/4	-1 1/2	12.2
N	NCR	25-	43	41 1/2	-3/8	-0.8
N	PERKIN-ELMER	22-	22	31 7/8	+1 5/8	+5.3
N	PRIME COMPUTER INC	15-	24	22 1/4	-1 1/4	-5.3
N	SPERRY CORP	39-	59	48 1/4	-2	3.8
O	STRATUS COMPUTER INC	9-	25	21 1/2	-1 1/8	-4.8
O	TANDEM COMPUTERS INC	13-	29	22 1/8	+1 1/4	+5.6
N	TANDY CORP	24-	42	37 3/4	-2 5/8	-6.5
O	TELEVIDEO SYSTEMS	2	4	3	-1/8	-4.0
O	TELXON CORP	10-	23	23	+1/4	+1.0
N	TEXAS INSTRUMENTS	86-	122	106 1/2	-1 5/8	-1.5
A	ULTIMATE CORP	8-	28	23 5/8	2 1/2	-9.5
O	VECTOR GRAPHICS INC	0-	1	1/8	0	0.0
A	WANG LABS "B"	15-	29	18 7/8	-5/8	-3.2
A	WANG LABS "C"	15-	29	18 3/4	-1	-5.0
N	XEROX CORP	37-	81	56 3/8	-2 1/8	-3.5
	SUPPLIES & ACCESSORIES					
N	AMERICAN BUS PRODS	21-	35	29 5/8	-1/2	-1.8
N	BARRY WRIGHT	17-	29	18 1/2	+3/8	+1.9
A	DUPLEX PRODUCTS INC	13-	22	18 5/8	-1 1/8	5.6
N	ENNIS BUS. FORMS	14-	24	22 3/8	-1/8	-0.5
N	3M COMPANY	74-	92	88 1/4	0	0.0
N	MOORE CORP LTD	15-	22	18 5/8	-7/8	-4.4
O	STANDARD REGISTER	22-	39	33 3/4	2 1/4	-6.2
N	WALLACE COMP SERVICE	30-	41	38 3/8	-1 3/8	3.4

EXCH: N—NEW YORK; A—AMERICAN; P—PACIFIC; B—BOSTON; L—NATIONAL; M—MIDWEST; O—OVER-THE-COUNTER

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

EXCH		52 WEEK RANGE (1)		PRICE CLOSE JAN 22 1986	WEEK NET CHNGE	WEEK PCT CHNGE
	SEMICONDUCTORS					
N	ADVANCED MICRO DEV	22	38	28	0	0.0
O	ADV D SEMICONDUCTOR	7-	23	6	0	0.0
N	ANALOG DEVICES INC	18-	38	26	-1/4	-0.6
O	ANALOGIC CORP	11-	16	14	+3/8	+2.7
N	APPLIED MAGNETICS CP	8-	17	17	0	0.0
O	AVANTEK	18-	26	18 1/4	-7/8	-4.5
O	HADCO CORP	3-	7	6	-1/8	-2.0
O	INTEL CORP	21	33	29 1/2	+1 1/8	+3.6
O	MICRO MASK INC	9-	12	6 3/4	0	0.0
N	MOTOROLA INC	29-	41	38 7/8	-1/2	-1.3
N	NAT'L SEMICONDUCTOR	10-	15	12 1/2	-3/8	-2.9
N	TERADYNE	17-	33	22	+3/8	+1.7
	SOFTWARE & EDP SERVICES					
O	ADVANCED COMP TECH	2-	4	4	+1/4	+6.6
N	ADVANCED SYSTEMS INC	9-	18	16 7/8	0	0.0
N	AGS COMPUTERS INC	10-	24	20 3/4	-1 1/8	-5.1
O	AMERICAN SOFTWARE	9-	15	13 3/4	1/4	-1.7
N	ANACOMP INC	2-	4	3 3/8	-3/8	-10.0
O	ANALYSTS INTL CORP	5-	11	7	-1/2	-6.6
O	ASHTON TATE	9-	20	16 3/8	+1/8	+0.6
O	ASK COMPUTER SYSTEMS	7-	25	12 3/4	-1/4	-1.6
B	ASTRADYNE COMP IND	1	3	2	0	0.0
N	AUTOMATIC DATA PROC	35-	60	60 1/8	+1 3/8	+2.3
O	COMPUTER NETWORK	5-	6	5 1/4	-1/8	-2.3
O	COMPUTER ASSOC INT'L	18-	35	33	-3/4	-2.2
O	COMPUTER HORIZONS	5-	11	10 3/8	-1/8	1.1
N	COMPUTER SCIENCES	13-	34	30 1/2	-2 3/4	-8.2
O	COMPUTER TASK GROUP	10-	24	23 1/4	+1 1/2	+8.8
O	COMPUTER USAGE	1-	3	1 5/8	0	0.0
O	COMPUTONE SYSTEMS	4-	11	4 3/4	-1/4	-5.0
O	COMSERV CORP	1-	8	3 1/2	0	0.0
O	COMSHARE	7-	12	10 7/8	1/8	-1.1
N	CULLINET SOFTWARE	13-	33	17	1	-5.5
O	CYCARE SYSTEMS INC	19-	27	20 1/4	-1	-4.7
O	HOGAN SYSTEM INC	4-	12	8 3/4	+1/2	+6.0
N	GENERAL ELECTRIC CO	56-	74	67	-1 1/4	1.8
N	GENL MOTORS E (EDS)	20-	47	39 5/8	+2 3/8	+6.3
N	GTE CORP	38-	47	46 1/4	7/8	1.8
O	INFORMATION SCIENCE	1-	5	2	+1/8	+6.6
O	INFOTRON SYSTEMS CP	13-	24	14 1/2	-1 1/2	-9.3
O	KEANE ASSOCIATES	10-	20	14 1/4	3/4	-5.0
N	LOGICON	25-	43	39	0	0.0
O	LOTUS DEVELOPMENT CP	15-	34	23 3/4	-3/4	3.0
O	MCI COMMUNICATIONS	7-	12	11 1/2	-1/2	-4.1
O	MNGT SCI AMER INC	7-	18	12 1/8	3/8	-3.0
O	MATHEMATICAL APP GRP	1-	8	1 7/8	0	0.0
O	MICOM SYSTEMS INC	12	35	22	+2	+10.0
O	MICROPRO INT'L CP	2	4	2 1/4	-1/4	-12.2
O	NATIONAL DATA CORP	9-	16	17	1/2	-2.8
O	ON-LINE SOFTWARE INT	4-	11	10	-1/4	2.4
O	PANSOPHIC SYSTEMS	14-	27	27	+1 1/4	+4.8
N	PLANNING RESEARCH	11-	18	14 7/8	-1/2	-3.2
O	POLICY MGMT SYSTS CP	17	35	16 3/4	-5 3/4	25.5
O	PROGRAMMING & SYS	4-	8	7 3/4	0	0.0
O	REYNOLDS & REYNOLD	31	57	52	+1/2	+0.9
O	SEI CORP	13-	26	24 1/4	1 1/4	-4.6
O	SHARED MEDICAL SYST	26-	37	30	2 5/8	-8.0
O	SCIENTIFIC COMPUTERS	5-	8	5 1/8	1/8	-2.3
O	SOFTWARE AG	12	22	16 3/4	0	0.0
N	URS CORP	10-	14	12	1/4	2.0
N	UCCEL	11	17	16 1/8	1/4	1.5
O	VM SOFTWARE	17-	24	22 1/2	+3/4	+3.4

EXCH		52 WEEK RANGE (1)		PRICE CLOSE JAN 22 1986	WEEK NET CHNGE	WEEK PCT CHNGE
	PERIPHERALS & SUBSYSTEMS					
P	AM INTERNATIONAL	3-	8	5 5/8	1/8	-2.1
A	ANDERSON JACOBSON	2-	5	2 1/4	0	0.0
O	AST RESEARCH INC	7	33	26 1/8	+1 1/8	+4.5
O	AUTO-TROL TECHNOLOGY	3-	13	4 3/8	3/8	-7.8
O	AVANT-GARDE COMPUTNG	3-	21	4 3/4	0	0.0
O	BANCTEC INC	6-	12	8	7/8	-9.8
O	BEEHIVE INT'L	1	2	1/8	0	0.0
N	BOLT BERANEK & NEW	20-	37	34 1/2	+5/8	+1.6
O	CAMBEX CORP	1-	3	1 1/8	+1/8	+26.6
N	CENTRONICS DATA COMP	3-	11	4 5/8	1/4	-5.1
A	CETEC CORP	5-	6	7 1/4	+1/8	+1.7
A	COGNITRONICS	4-	7	4	3/8	-8.5
N	COMPUGRAPHIC CORP	24-	38	26 1/2	-1/2	-1.8
O	COMPUTER TRANSCEIVER	0-	1	3/8		-14.3
N	COMPUTERVISION CORP	9-	44	12	0	0.0
N	CONRAC CORP	12-	17	18 1/4	1/2	2.8
4	DATAPRODUCTS CORP	11	20	15 1/8	-1/4	1.6
A	DATARAM CORP	4-	6	8 1/4	-1/4	2.8
O	DATA SWITCH CORP	4-	6	6 1/4	+1/4	+4.1
O	DATUM INC	8-	8	5 1/2	0	0.0
O	DECISION DATA COMPUT	10-	20	12 1/2	0	0.0
O	ENDATA, INC	2	6	4 1/4	1/4	-5.5
O	EVANS & SUTHERLAND	12	21	18 1/4	+3/4	+4.0
O	GANDALF TECHNOLOGIES	9-	13	6 1/2	+3/8	+6.1
N	GEN'L DATA COMM IND	8-	21	11 1/4	-3/8	-3.2
N	HAZELTINE CORP	20-	30	23 5/8	-1 1/8	-4.5
O	ICOT CORP	3-	6	8 3/8	1/8	-1.4
O	INFORMATION INTL INC	10-	17	13	+1/8	+0.9
O	INTECOM INC	4-	11	5	-5/8	-11.1
4	LUNDY ELECTRONICS	10-	15	13 7/8	+1/2	+3.7
O	MEGADATA CORP	3-	8	4 1/4	-1/8	2.8
4	MSI DATA CORP	7-	13	10 7/8	0	0.0
N	NASHUA CORP	24	22	20 5/8	-1 1/4	3.8
O	NETWORK SYSTEMS CORP	14-	27	15 7/8	+1 5/8	+11.4
N	NO AMERICAN PHILIPS	32	45	38	+1	+2.7
N	NORTHERN TELECOM LTD	27	41	26 7/8	5 3/4	17.6
O	OMEX	1	3	1/2	0	0.0
N	PARADYNE CORP	7	16	6 5/8	3/8	-5.3
4	PENRIL CORP	7-	14	6 3/8	1/4	2.6
N	PLESSEY CO (ADR)	18-	28	22 1/2	-1 1/2	-6.2
O	PRINTRONIX INC	9-	18	12 3/4	-1/8	-0.8
O	QMS INC	8-	18	10 3/8	1/8	1.1
O	RAMTEK CORP	2	7	3 1/4	0	0.0
N	RECOGNITION EQUIP	9-	17	14 7/8	3/8	2.4
N	SANDERS ASSOCIATES	30-	44	34 3/4	-1/4	-0.7
O	SCAN-TRON CORP	9-	17	16 1/2	+1/2	+3.1
N	SCIENTIFIC ATLANTA	10	18	12	+3/8	+3.2
O	SEAGATE TECHNOLOGY	5-	6	6 1/2	+1/4	+3.0
N	STORAGE TECHNOLOGY	1-	4	2 7/8	0	0.0
O	SYKES DATATRONICS	0-	2	1/8	+1/16	+50.3
4	T BAR INC	5-	6	6	0	0.0
A	TAB PRODUCTS CO	14-	21	17 5/8	+1/2	+2.9
O	TANDON CORP	3-	6	4 3/8	0	0.0
A	TEC INC	7	13	8 1/2	1/8	1.8
N	TEKTRONIX INC	47-	68	56 1/4	3/4	-1.3
N	TELEX	24-	81	81	+1/2	+0.8
O	TESDATA SYSTEMS CP	0-	3	1 1/4	0	0.0
N	TIMEPLEX INC	15-	23	16 7/8	+3/8	+2.2
N	TITAN CORP	4	10	8 5/8	3/8	3.7
O	VISUAL TECHNOLOGY	1	3	3/4	+1/8	+20.0
	LEASING COMPANIES					
N	COMDISCO INC	10-	26	25 7/8	+3 7/8	+17.6
N	CONTINENTAL INFO SYS	5-	16	15 1/2	+5/8	+4.2
O	FINALCO GROUP INC	4	5	4 1/8	1/8	2.8
O	PHOENIX AMERICAN INC	2	4	3 7/8	0	0.0
O	SELECTERM INC	7	12	7	0	0.0
N	U.S. LEASING	22	43	38	1 1/2	-3.7

Source: Trade Quotes, Inc.

COMPUTER INDUSTRY

INSIDE

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Microsoft acquires Cytation, a closely held compact disk read-only memory software start-up firm/**120**

INSTANT ANALYSIS

"The character and pace of the third-party service business is very different from selling computers. The most important part of entering third-party maintenance is knowing the culture of your business and what parts of it you have to change."

— William E. Charlton, vice-president of marketing and business management, Customer Services Division, Honeywell Information Systems

Climbing out of the slump

Burroughs, Prime improve; DG, Apollo remain mired

By Clinton Wilder

Fourth-quarter 1985 earnings announced by several leading vendors last week continued to paint a very mixed picture of the current state of the computer industry. While Burroughs Corp., Sperry Corp., Prime Computer, Inc. and Stratus Computer, Inc. posted moderate to strong gains over their year-earlier results, Data General Corp., Harris Corp. and Apollo Computer, Inc. all continued to be mired in 1985's severe demand slump.

Overall results generally indicated that the tide of industry conditions is gradually rising but not enough to lift companies beset by reliance on older product lines or reorganizational difficulties. "In this quarter, individual corporate performances were more related to individual product cycle dynamics than any macro conditions," said Michael Geran of E. F. Hutton & Co. "Those companies in the right part of their product cycles are making profits that way, while others, like Burroughs and Prime, are doing it on cost controls."

■ **Burroughs.** The Detroit-based vendor's comprehensive cost-cutting program reaped the dividends of a 23% pretax earnings gain on just an 8% rise in revenue. Net income was $115.3 million, or $2.42 per share, compared with $94.4 million, or $2.08 per share, in the year-earlier quarter. Sales were $1.48 billion, up from $1.37 billion a year ago.

The company said sales of its A 3 and A 15 mainframes, B25 clustered workstations and document processing systems were strong, particularly in Asian and Latin American markets. Chairman W. Michael Blumenthal said foreign sales kept Burroughs barely profitable for the year, overcoming losses in its U.S. sales and Memorex Corp.'s peripherals business.

Burroughs ended the year with a 1% gain in profits, from $244.9 million, or $5.40 per share, to $248.2 million, or $5.46

See **CLIMBING** page 120

Out-of-court settlement allows Apple to preview Next product

By Peggy Watt

CUPERTINO, Calif. — Apple Computer, Inc. and cofounder Steve Jobs reached an out-of-court settlement last week in Apple's suit to prevent Jobs from hiring away Apple employees or using proprietary technology for his new company.

Under terms of the agreement, Apple will be able to preview for 30 days the first product from Jobs' new company, Next, Inc., of Palo Alto, Calif. According to the settlement, that product may be released no sooner than July 1987. Apple may inspect the machine to ensure Jobs does not use the Apple technology to which he was privy before resigning as chairman of the board last summer.

Jobs has said he wants to produce a high-end educational computer that he does not expect to be out until late 1987. While the focus of Apple's educational market has been in the kindergarten through 12th grade public school system, its Macintosh computer has been promoted at the university level.

The agreement also prohibits Jobs from hiring away any more Apple employees for his new venture for at least six months. Apple agreed to drop its charges against former Apple engineer Richard Page, who was allegedly working on next-generation projects when he left the company to join five other Apple employees

See **SETTLEMENT** page 100

INDUSTRY INSIGHT
Clinton Wilder
CW Senior Editor

IBM results get mixed reviews

It was a very busy fourth quarter for IBM's financial and marketing strategists. Every week seemed to bring news of a product or corporate repositioning, whether it was increasing mainframe software prices, cutting microcomputer hardware prices, pulling the plug on future authorized Big Blue dealers or rushing as many Sierras as possible out the door.

IBM's goal, of course, was to pump up its fourth-quarter earnings and revenue enough to overcome the Great Slump's legacy of three consecutive yearly profit declines. It was a tall order for any company, but Wall Street's leading sages were firmly confident that the pride of Armonk, N.Y., was up to the challenge.

The results came in 10 days ago, and the reviews were strangely mixed. One man's booming $17 billion quarter was another's disappointment. Those who favor the half-full glass philosophy could easily hail IBM's 23.4% gain in profits for the fourth quarter past compared with a year earlier as a company and industry turnaround. The half-empty glass crowd, however, chose to focus on the 0.4% dip in the full-year bottom line. IBM used every weapon in its competitive arsenal to achieve earnings growth for the year — and failed.

The question now is, What does IBM have left for 1986? Plenty of new products, of course. But all indications are that 3090 Model 200 shipments peaked in the last quarter. If that is true, it would significantly reduce what has been a high-margin revenue bonanza.

See **IBM** page 99

The urge to merge: Partnerships increase as industry grows

1985: Record year for first-time acquisitions

By Clinton Wilder

FORT LEE, N.J. — As a quick scan of the year's computer industry besdlines would reveal, 1985 was a record year for mergers and acquisitions, according to the computer industry's leading index.

The seventh annual ADAPSO/Broadview Index, developed jointly by the Association of Data Processing Service Organizations, Inc. and Broadview Associates, noted a 42% increase over 1984 in software and services mergers and acquisitions. The index noted 203 such partnerships formed in the software, DP services, computer consulting, training and maintenance businesses — up from 143 in 1984.

The value of the year's acquisitions reached $2.68 billion, more than double the comparable figure of $1.15 billion in the previous year. The 1984 figure excludes the industry's largest acquisition ever, General Motors Corp.'s purchase of Electronic Data Systems Corp. for $2.6 billion.

Fifty firms completed their first software or services acquisition in 1985, with 23 of those buyers coming from outside the industry. The buyers included divested Bell operating companies, which accounted for two of the year's 10 largest purchases: Ameritech's acquisition of Applied Data Research, Inc. and Bell Atlantic Corp.'s purchase of Sorbus, Inc.

First-time buyers also included several leading hardware vendors, including Hewlett-Packard Co., Wang Laboratories, Inc. and NCR Corp. "Hardware companies are increasingly concerned about product and market differentiation," according to Broadview partner Harvey L. Poppel.

1986: BUNCH considered ripe for consolidation

By Edward Warner
Computerworld News Service

When Sperry Corp. and Burroughs Corp. said they were considering a merger last year, the announcement confirmed months of speculation that the membership of the mainframe manufacturing fraternity known as the BUNCH — Burroughs, Sperry (Univac), NCR Corp., Control Data Corp. and Honeywell, Inc. — was long overdue for a consolidation.

Though Sperry and Burroughs never went to the altar, speculation over a marriage in the BUNCH has only intensified.

According to analysts, conditions are ripe for a merger in the BUNCH because of the duplication of effort each company endures, particularly in research and development, and the precipitous fall that has occurred in mainframe hardware prices.

This year, according to observers like Gilbert Mintz, a partner at Fort Lee, N.J.-based Broadview Associates, it is likely there will be a merger within the BUNCH companies. Broadview Associates engineered the union of Applied Data Research, Inc. and Ameritech in 1985 and is considered the top merger and acquisitions company in the computer industry.

International Data Corp. (IDC), the Framingham, Mass., industry research firm, lists a BUNCH company merger as one of its "top stories of 1986" in a recently published forecast report. Don Bellomy, editor of the IDC-published "EDP Industry Report" newsletter, said Sperry is the most likely of the BUNCH either to be acquired by or to buy one of its competitors in the BUNCH this year.

See **BUNCH** page 98

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